**IN THE UNITED STATES DISTRICT COURT**
**DISTRICT OF MINNESOTA**

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|---|---|
| IN RE PORK ANTITRUST LITIGATION | Case No. 0:18-cv-01776 (JRT-JFD) |
| | **[FILED UNDER SEAL]** |
| | **REPLY DECLARATION OF HAL J. SINGER, PH.D. IN SUPPORT OF CONSUMER INDIRECT PURCHASER PLAINTIFFS' MOTION FOR CLASS CERTIFICATION** |
| *This Document Relates to*: | |
| All Consumer Indirect Purchaser Plaintiff Actions | |

*** HIGHLY CONFIDENTIAL PURSUANT TO PROTECTIVE ORDER ***

# TABLE OF CONTENTS

## INTRODUCTION

1. I have been asked by Plaintiffs' counsel to review and respond to the expert reports of Dr. Laila Haider[1] and Dr. James Mintert[2] ("Defendants' Experts"). Having reviewed the various claims and criticisms made by Defendants' Experts, I am not persuaded to change any opinion or analysis from my Class Certification Report.[3] I have also been asked to briefly respond to four factual misrepresentations made by Defendants' counsel in Defendants' Memorandum of Opposition to class certification[4] and in their Daubert motion to exclude my testimony.[5]

2. Defendants' Experts' criticisms of my Class Certification Report are narrowly limited to my econometric overcharge model (Part IV of my Class Certification Report)[6] and my analysis of common impact (Part V).[7] Unrelated to my report, Defendants' Experts advance two novel arguments regarding (1) Defendants' alleged lack of "control" over hogs in the upstream input market for Pork,[8] and (2) my alleged failure to provide any but-for analysis of the various "levers" Defendants could have used to reduce domestic availability of Pork—although they do not dispute the fact that I did measure but-for quantities of Pork, the actual metric in question.[9] In this reply report, I respond to Defendants' Experts' specific modeling critiques of my report, and explain why the two novel arguments raised by Defendants' Experts' are, from an economic perspective, irrelevant to analyzing Plaintiff's theory of harm.

3. Defendants' Experts have *not* offered any rebuttal to approximately half of my Class Certification Report. Neither Dr. Haider nor Dr. Mintert dispute my analysis of

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[1] Expert Report of Dr. Laila Haider (Aug. 24, 2022) [hereafter Haider Report].

[2] Expert Report of James Mintert, Ph.D. (Aug. 24, 2022) [hereafter Mintert Report].

[3] Declaration of Hal J. Singer, Ph.D. in Support of Consumer Indirect Purchaser Plaintiffs' Motion for Class Certification [hereafter Singer Report or Class Certification Report].

[4] Memorandum of Law in Opposition to Consumer Indirect Purchaser Plaintiffs' Motion for Class Certification [hereafter Defendants' Memorandum of Opposition].

[5] Memorandum of Law in Support of Defendants' Joint Motion to Exclude The Expert Report and Testimony of Dr. Hal Singer [hereafter Daubert Motion].

[6] Dr. Haider critiques my regression analysis in Part VI of her report. Dr. Mintert does not directly criticize my regression but implies that my model may have omitted certain export variables in Part V of his report.

[7] Dr. Haider critiques my analysis of Direct Purchaser impact in Part VI of her report and my analysis of Indirect Purchaser impact in Part VIII of her report. She admitted she offered no opinion to the other sections of my report at deposition. *See* Deposition of Laila Haider (Nov. 3, 2022) [hereafter Haider Dep.] at 236:8-13 (no analysis of Part II) 242:8-17 (no analysis of Part III).

[8] Dr. Haider makes this argument in Part V.A of her report. Dr. Mintert makes this argument in Part III of his report.

[9] Dr. Haider makes this argument in Part V of her report. Dr. Mintert does not make this argument directly, but discusses hog production decisions, exports, and capacity in Part IV through VI of his report.

Defendants' market power over Pork products (Part II of my Class Certification Report), or my analysis demonstrating that sales of Pork in the United States is the relevant antitrust market.[10] Nor does either expert dispute my economic analysis of the *qualitative evidence* on a class-wide basis, which is consistent with a conspiracy and inconsistent with competition (Part III). Additionally, Defendants' Experts fail to offer any criticism of my methodology for calculating Aggregate Damages to the Class of Indirect Purchasers (Part VII), nor do they offer any rejoinder to my opinion that the evidence reviewed is inconsistent with unilateral conduct absent collusion (Part VIII). These omissions should be understood as a concession that neither of Defendants' Experts were able to call into question the class-wide methodologies I employ or the class-wide evidence I reviewed in these sections of my Class Certification Report.

4. I note that Plaintiffs allege violations under both a *per se* or, in the alternative, a rule-of-reason standard.[11] Neither of Defendants' experts present any evidence that challenges Plaintiff's *per se* allegation—indeed, Dr. Haider actually "assume[s] it to be true that Defendants engaged in the conduct."[12] Specifically, neither expert disputes my assessment of Defendants' and Co-Conspirators' collective market power over Pork products, nor my assessment of the *qualitative evidence of collusion* that is consistent with a cartel and inconsistent with competition.

5. Defendants' Experts' replies are limited to narrow criticisms of my overcharge model (Part IV of my Class Certification Report) and my analysis of common impact (Part V). Neither of Defendants' Experts challenges the fact that the quantitative data I used is common to the class, nor does either expert dispute the fact that the multiple regression analysis I employed in the overcharge model is both a "well-accepted scientific methodology"[13] and a standard empirical method for testing alleged anticompetitive conduct in antitrust litigation.[14] To the contrary, Dr. Haider's criticisms of my overcharge regression model boils down to a claim that her *variant overcharge models* yield different,

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[10] "Pork" remains defined as "pork bacon and the following types of raw pork, whether fresh or frozen: bellies, loins, ribs, shoulders, or pork chops." Excluded are any products that are marketed as organic, no-antibiotics ever, or are pre-cooked, or any product other than bacon that is marinated, seasoned, flavored, cooked, or breaded." Singer Report ¶4.

[11] Consumer Indirect Purchaser Plaintiffs' Second Amended Consolidated Class Action Complaint, In Re: Pork Antitrust Litigation, Case No. 18-cv-01776-JRT-JFD, filed November 6, 2019) ¶13 [hereafter *Complaint*].

[12] Haider Report ¶8.

[13] Singer Report ¶145 (citing Daniel L. Rubinfeld, *Reference Guide on Multiple Regression*, 3 REFERENCE MANUAL ON SCIENTIFIC EVIDENCE 303–357, 308 (2011) [hereafter *Reference Manual*].

[14] Singer Report ¶146 (citing Johnathan Baker & Daniel Rubinfeld, *Empirical Methods in Antitrust Litigation: Review and Critique,* 1 AMERICAN LAW AND ECONOMICS REVIEW 386-435 (1999).

but still economically and statistically significant price overcharges,[15] and that her *variant pass-through models* yield different, but still economically and statistically significant pass-through.[16] If nothing else, this should be taken as an admission of the data and regression model's validity as a method for class certification.[17] Whether my original model or her variant of my model is the correct model implicates zero individualized issues.

6. Only one expert, Dr. Haider, makes a singular *class-wide methodology* challenge to one element of my report: that one of the two methods I use to demonstrate common impact to Direct Purchasers (the "In-Sample Prediction" method in Part V.A of my initial report) is mechanically "circular" and "not a standard approach in the academic economics literature."[18] Even if Dr. Haider were correct on this point (her uncited and unsupported claims are directly contradicted by the literature I cite in my report), her *own variant models* of the *second* method I employ would demonstrate a common price structure for Pork products, and thus common impact for Direct Purchasers.[19] Nothing in Defendants' Experts' reports, *even if their assertions and variant models are taken at face value*, undermine the proposed methodologies in my Class Certification Report for establishing class-wide impact using common data.

7. In fact, Plaintiffs could establish Class-wide impact using *Dr. Haider's report on its own*. This is because while Dr. Haider criticizes many individual modeling decisions in my report, she often does not dispute the underlying method, and her *own variant models using the underlying method* show positive overcharge, common impact, and evidence of pass-through. In Table 1 below, I show how some of Dr. Haider's own analyses *could* be used as a proof of class-wide impact. (Green cells indicate conclusions in favor of Plaintiffs' theory, red cells indicate direct rejections of it.)

[15] For example, in Exhibit 22 of her report, Dr. Haider uses a variant of the hog cost variable that redefines the conduct period and still shows 2.9 percent price inflation at a statistically significant level.

[16] Similarly, Dr. Haider does not dispute that the method I used to estimate pass-through is standard and uses evidence common to the class. Instead, she advances her own variation that *also* shows pass-through rates of approximately 100 percent (Exhibit 42 and its backup).

[17] Dr. Haider does dispute the in-sample prediction method I used. I respond to this criticism in Part II.B.4, *infra*.

[18] Haider Report ¶¶149–155.

[19] Haider Report Appendix D-34.

TABLE 1: BOTH DR. SINGER'S AND DR. HAIDER'S REPORTS ESTABLISH CLASS-WIDE IMPACT

| | Dr. Singer | | Dr. Haider | |
|---|---|---|---|---|
| | **Conclusion** | **Detail** | **Conclusion** | **Detail** |
| **Evidence of Market Power?** | **Yes** | SR II | ***Not Disputed*** | -- |
| **Evidence of Collusion?** | **Yes** | SR III | ***Not Disputed*** | -- |
| **Evidence of Overcharge to Direct Purchasers?** | **Yes** | ~12% (Table 12) | **Yes** | 0.4%, 2.9%, 4.2% (Exhibits 14 & 22) |
| **Evidence of Impact to All Direct Purchasers?** | **Yes** | | **Yes** | -- |
| *In-Sample Prediction* | Yes | Over 99.9% (Table 16) | No | HR VI.E |
| *Evidence of Price Structure* | Yes | Table 17 | Yes | Exhibit D-34 |
| *Direct Purchaser, Product Category, and Defendant Specific Regressions* | Yes | Tables 23 - 25 | ***Not Disputed*** | -- |
| *Individual Direct Purchaser Regression* | -- | -- | Yes | Over 96% (Exhibit D-13) |
| **Evidence of Pass-Through?** | **Yes** | | **Yes** | |
| *Theory* | Yes | ~100% (SR V.C.1) | ***Not Disputed*** | -- |
| *Record Evidence* | Yes | ~100% (SR V.C.2) | ***Not Disputed*** | -- |
| *Pass-Through Regression* | Yes | ~100% (SR V.C.1) | Yes | ~90-100% (Exhibit 42) |
| *Pricing Strategy Exceptions* | Yes | -- | No | HR VIII.C |
| **Classwide Impact?** | **Yes** | | **Yes** | |
| **Evidence and Methods Common?** | **Yes** | | ***Not Disputed*** | |

Note: "SR" means Singer Report, "HR" means Haider Report.

8. My reply report is organized as follows: In Part I, I briefly respond to factual misrepresentations made by Defendants' counsel in their Memorandum of Opposition and Daubert Motion. In Part II, I respond to the arguments made by Dr. Laila Haider that pertain to my Class Certification Report in the same order in which they are made in her report.[20] In Part III, I respond to certain arguments made by Dr. James Mintert that I have purportedly failed to account for various factors of supply and demand in my models. No analysis presented in this report is intended to supersede any analysis from my initial report.

[20] Dr. Haider's report also contains critiques of Direct Purchaser Plaintiffs' expert Dr. Russell Magnum, as well as Commercial and Institutional Indirect Purchaser Plaintiffs' expert Dr. Michael Williams, which I do not address.

## I. RESPONSE TO DEFENDANTS' MEMORANDUM OF OPPOSITION AND DAUBERT MOTION

### A. Defendants' Memorandum of Opposition and Daubert Motion Are Replete with Factual Misrepresentations

9. Defendants' counsel have made four factual misrepresentations in their Memorandum of Opposition and their Daubert motion. Ignoring the other arguments in these memorandums, I briefly address these factual errors below.

10. *First*, in Defendants' Memorandum of Opposition, Defendants' counsel misquotes the abstract from my 2014 book chapter co-authored with Dr. Kevin Caves.[21] This misquotation is significant, because Defendants' version implies that it is my opinion that econometric methods cannot inform common impact. This is exactly the opposite of what is actually written in the book chapter and the opposite of my position. Defendants' counsel write in their memorandum that:

> Dr. Singer himself has co-authored an entire book chapter which, according to the abstract, addresses the problem that "[e]conometric methods estimat[ing] the average effect of the challenged conduct … do not inform impact for individual class members.[22]

The actual quote from the abstract is (emphasis mine showing the omitted language):

> Econometric methods *typically applied in antitrust and other settings* estimate the average effect of the challenged conduct, but do not inform impact for individual class members. *We present classwide econometric methods and statistical tests for detecting the existence (or lack thereof) of common impact and determining what proportion (if any) of the proposed class suffered injury in many class actions. We conclude that econometric tools can meaningfully inform the legal process, even when courts demand proof of common impact*.[23]

To be clear, this 2014 book chapter is consistent with the methods I used. The overcharge model I employ in Part IV of my Class Certification report is one type of econometric method that estimates the average effect of the challenged conduct, while the In-Sample

[21] Kevin Caves & Hal Singer, *Econometric Tests for Analyzing Common Impact*, THE LAW AND ECONOMICS OF CLASS ACTIONS (2014) [hereafter Caves & Singer 2014]. The essay was also published as an article in *Research in Law and Economics*.

[22] Defendants' Memorandum of Opposition at 20.

[23] Caves & Singer 2014 at 135.

Prediction of Common Impact I employ in Part V of my Class Certification report is one type of "econometric tool" for detecting the existence of common impact.

11. *Second,* referencing the same book chapter, Defendants' counsel appear to deliberately misattribute my quotation of *other authors' opinions* as my own opinion, by deliberately removing quotation marks and footnotes. Defendants' counsel writes (formatting from Defendants' memorandum):

> As Dr. Singer explained in this chapter:
>
> > antitrust practitioners have cautioned against using an econometric model at the class-certification stage that assumes that a conspiracy has the same effect on every purchaser and focuses on an average effect. Such a model may hide variation across class members. If one is attempting to test whether there is an impact on all members of a proposed class that assumption is not valid, as it assumes the very proposition that is being tested.
>
> Caves & Singer at 139 (cleaned up).[24]

Defendants' counsel's "cleaned up" version blatantly misattributes this language as being my own. This passage occurs in the introduction, where I discuss the various legal decisions that have informed antitrust standards to date. In this passage, I quote language from an *American Bar Association primer on econometric techniques for lawyers*.[25] The unedited passage is below (formatting and footnotes original):[26]

> In light of developments such as these, it is not difficult to see why antitrust practitioners have cautioned against using an econometric model at the class-certification stage that "assumes that a conspiracy has the same effect on every purchaser and focuses on an average effect …."[26] Such a model "may hide variation across class members. If one is attempting to test whether there is an impact on all members of a proposed class … that assumption is not valid, as it assumes the very proposition that is being tested."[27]

Had Defendants' counsel read further, they would have seen that my actual opinion in the chapter is that "there exists common econometric tools capable of meaningfully informing

[24] Defendants' Memorandum of Opposition at 21.

[25] Nelson, P., McFarland, H. B., & Smith, D., *The Use of Econometrics in Class Certification, Econometrics: Legal, Practical, and Technical Issues,* AMERICAN BAR ASSOCIATION, 222 (2005).

[26] Caves & Singer 2014 at 139.

the legal process, even when courts demand proof of common impact."[27] Again, the In-Sample Prediction of Common Impact method I used in Part V of my Class Certification report is one such econometric tool.

12. *Third,* in Defendants' Daubert Motion, Defendants' counsel claim that I made "the faulty assumption that Defendants are vertically integrated," which purportedly renders my theories unreliable.[28] This again is simply untrue: I never assume vertical integration anywhere in my report.[29] Defendants' counsel cite my inclusion of investor analysis and Smithfield's internal documents, [redacted].[30] My citation of other authors' language in the record evidence is not my own assumption of vertical integration. I simply do not discuss Defendants' vertical integration anywhere in my report outside of the context of the phrase appearing in record evidence. For example, nowhere in the background section of my report, where I divide the Pork supply chain into the raising, processing, and distribution of Pork, do I comment that any of these steps are vertically controlled by the same entity.[31] Moreover, this point is analytically irrelevant, because none of my analyses in my initial report turn on Defendants' vertical integration or lack

[27] *Id.* at 140.

[28] Daubert Motion at 8. ("Dr. Singer's opinions are premised on the faulty assumption that Defendants are vertically integrated—that, in addition to processing pigs into pork, Defendants own and raise the animals themselves. This fundamental misunderstanding renders his theory that 'Defendants collectively wield market power over pork, which would allow them to profitably inflate prices over the competitive level' unreliable and unhelpful.").

[29] Plaintiffs in their complaint allege that the pork industry is "nearly fully vertically integrated," citing to Defendants' use of "contract production of their hogs." *Complaint* ¶140. As I explain in Part II.A.2, the industry is more precisely vertically *restrained* rather than *integrated*. Regardless, I was not asked to assume vertical integration or restraint for any component of my qualitative or quantitative analysis.

[30] Singer Report ¶77 [redacted]

[31] Singer Report ¶26 ("The pork supply chain is summarized in Figure 2 below and can be described in three general steps: (1) the raising of live pigs for meat, (2) pig slaughter and processing into pork products, and (3) distribution and sale to the end consumers.").

thereof.[32] It is simply not an input to my analysis of market power, to my analysis of the qualitative evidence, to my regression analysis, or to my analysis of common impact.

13. *Fourth,* Defendants' counsel claims in the Daubert Motion that I "assumed" that Agri Stats performed the work of a cartel when reviewing the qualitative evidence.[33] Again, I make no such assumption when reviewing the qualitative evidence.[34] In Part III.A, I outline the economic criteria economists use to assess quantitative evidence of cartel behavior. In Part III.B, I then compare the record evidence from the case—the Agri Stats reports themselves, Defendants' apparent deanonymization of these reports, the Agri Stats "[redacted]"—and show that this record evidence satisfies the economic criteria for establishing the likelihood of a conspiracy. Defendants' counsel is of course entitled to disagree with how I performed my analysis, but I will note that neither of Defendants' Experts disagreed with it.[35]

14. It bears noting that in my nearly twenty years of serving as an expert witness, I cannot recall Defense counsel playing so fast and loose with basic facts. Defendants' Counsels' willingness to bend the truth exposes the weakness of their Daubert claims.

## B. Defendants' Counsels' "Ascertainability Problems" Are Unfounded

15. In their joint opposition to class certification, Defendants' counsel claims that the indirect purchaser class faces "ascertainability problems" because consumers may not know whether private label or unbranded Pork came from a Defendant or Co-Conspirator.[36] They claim that "nearly 80% of U.S. pork was processed by packers that are not defendants," indirectly citing my analysis of Defendants' 80 percent share of *hog slaughter capacity* in the United States.[37]

16. There is no "acertainability problem" in this case. Defendants supply the vast majority of defined Pork products, to the extent that if a consumer purchased Pork over the class period, they purchased from at least one Defendant with near statistical certainly for three reasons. *First,* Defendants had significant market share over in-class Pork products. *Second,* third-party data indicates that Defendants supplied the majority of purchased in-

[32] At deposition, Defendants' counsel brought up Defendants' vertical integration periodically. I briefly opined on how vertical integration is one type of "control" Defendants could wield over the market for hogs. I discuss this point in greater detail in Part II.A.3. Deposition of Hal Singer (June 24, 2022) [hereafter Singer Dep.] at 142:20-143:12.

[33] Daubert Motion at 12 (citing Singer Report ¶¶104–128).

[34] The only time I assume that the violation occurred is in testing common impact. This is not, however, related to my review of the qualitative evidence.

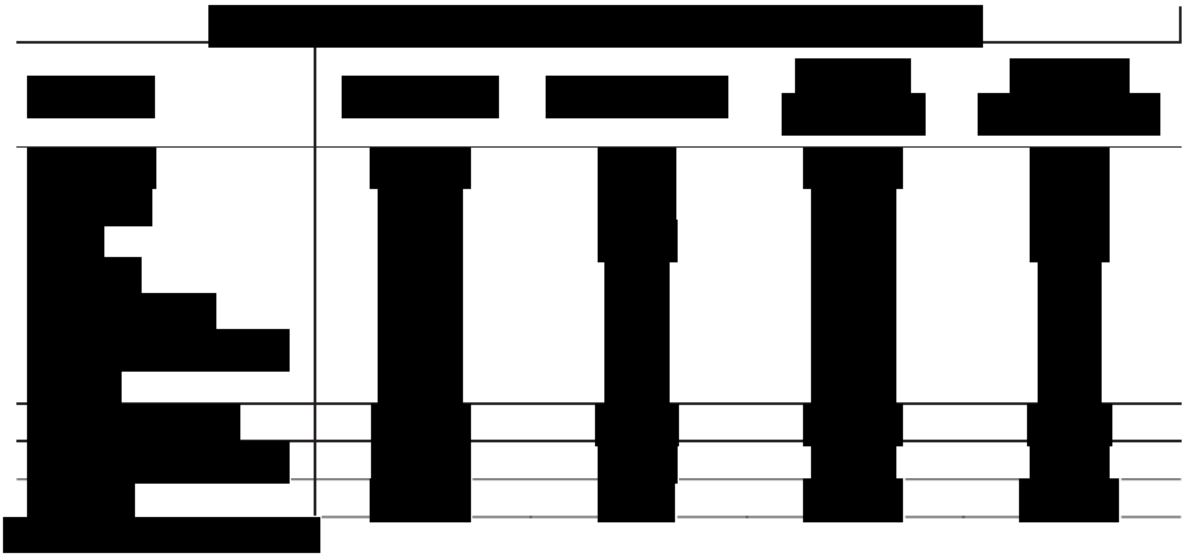
[35] To the contrary, Dr. Haider writes that "[f]or the purposes of this work, I assume it to be true that Defendants engaged in the conduct that Dr. Williams, Dr. Magnum, and Dr. Singer take to be "Challenged Conduct." Haider Report ¶8.

[36] Defendants' Memorandum of Opposition at 6–7.

[37] Singer Report ¶68, Table 3.

class products to consumers. *Third*, even if the 80 percent figure were the correct measure of Defendants' share of the Pork market, it would be virtually impossible for a consumer who purchases pork to purchase only non-Defendant pork over the entirety of the class period.

17. In my initial report, I analyzed hog slaughter data that showed Defendants own 80 percent of the hog-slaughtering capacity in the United States. Yet Defendants' collective share of in-class Pork products sales is higher than 80 percent. For example, when I eliminate companies that do not produce in-class products—such as companies that only produce pork sausages—the Defendants' market share of hog slaughter capacity increases from approximately 80 percent to 85 percent. This increase is illustrated in Table 2 below. This is a conservative estimate, given that several of the non-Defendant companies, such as [redacted], almost exclusively sell specialty products and sausages while also selling one or two in-class products, such as bacon. The entirety of the non-Defendant companies' market share is included, even if it primarily sells non-class products. This adjustment demonstrates how Defendants [redacted]



18. Setting this aside, even an 80 percent market share would result in virtually every Pork consumer purchasing a Defendant Pork product over the Class Period. This point is illustrated in Table 3 below. Statistically, if there is a twenty percent chance that any given pork product is *not* from a Defendant, if a consumer makes multiple purchases over the Class Period it is virtually impossible that a consumer will not purchase a Defendant Pork product.

19. The average pork consumer makes between 5.3 and 6.8 pork purchases per year.[38] That means that a consumer's probability of only purchasing non-Defendant Pork in a single year is between *0.020 and 0.002 percent*. Multiplied by the 3.5 years of the Class Period, the probability of a given consumer never purchasing a Defendant Pork product is less than *one in nine trillion*. Therefore, it would be nearly impossible for a pork consumer to only purchase non-Defendant products over the entirety of the class period, even when using the estimated 80 percent Defendant market share.

TABLE 3: CHANCE OF NOT PURCHASING DEFENDANT PORK

| [1] | [2] | [3] = [1]^[2] | [4] | [5] = [2]*[4] | [6] = [1]^[5] |
|---|---|---|---|---|---|
| **Chance NOT Defendant** | **Purchases Per Year** | **Chance to NOT Buy Defendant, One Year** | **Class Years** | **Class Purchases** | **Chance to NOT Buy Defendant, Over Class Period** |
| 20% | 5.3 | 0.020% | 3.5 | 18.55 | 1.08E-13 |
| 20% | 6.2 | 0.005% | 3.5 | 21.7 | 6.80E-16 |
| 20% | 6.7 | 0.002% | 3.5 | 23.45 | 4.07E-17 |
| 20% | 6.8 | 0.002% | 3.5 | 23.8 | 2.31E-17 |

20. Finally, the prevalence of Defendants' Pork products in the market can also be seen in the third-party data.[39] I analyzed the third-party retailers and distributors who provided vendor-specific purchase data and who deliver to retailers. Looking at class Pork products sourced from identifiable primary pork processors 99.3 percent of those came from a Defendant or Co-Conspirator, with the remaining 0.7 percent coming from Non-Defendant primary pork processors (such as [redacted]). The results are shown in Table 4 below.

[38] *See* 21CForum-0000008944 ("[redacted]"); HFC-PORKAT0000200877 [redacted] CLMNS-0000033170 [redacted]; AGSTAT-P-0003410325 [redacted]; and SMITHFIELD04739834 [redacted].

[39] I describe this data in ¶181 of my initial report.

TABLE 4: DEFENDANTS' SHARE OF THIRD-PARTY PURCHASES

| Third Party | Defendant Share of Primary Pork Processor Purchases | Non-Defendant Share of Primary Pork Processor Purchases | Total |
|---|---|---|---|
| [redacted] | | | |

Note: L clude
39 primary pork processors. See my workpapers for details.

## II. DR. LAILA HAIDER'S OPINIONS ARE UNAVAILING

21. Dr. Haider's report is an omnibus reply to Dr. Magnum (Direct Purchaser Plaintiffs), Dr. Williams (Commercial and Institutional Indirect Purchaser Plaintiffs), and myself (Consumer Indirect Purchaser Plaintiffs).[40] As mentioned in the introduction, Dr. Haider offers no reply to many portions of my report, such as my analysis of Defendants' market power over Pork or my analysis of the qualitative evidence of collusion. To the contrary, Dr. Haider begins her report by writing that "[f]or the purposes of this work, I assume it to be true that Defendants engaged in the conduct that Dr. Williams, Dr.

[40] Haider Report ¶4.

Magnum, and Dr. Singer take to be 'Challenged Conduct.'"[41] Because Dr. Haider offers no opinions pertaining to Parts II, III, VII, and VIII of my report, I do not discuss those topics further here.

22. Dr. Haider's summary opinion is that I have "failed to propose a methodology capable of establishing that the alleged conduct resulted in economic injury to all or nearly all members of the proposed class[,]" and that I have similarly "failed to propose a reliable methodology for calculating damages on a class-wide basis[.]"[42] According to Dr. Haider, she reaches this conclusion because (1) I purportedly failed to propose a methodology for establishing but-for levels of sow herds, hog slaughter, slaughter capacity, and exports;[43] (2) Defendants did not "control" the supply of hogs in the input market; (3) my overcharge regression model is purportedly improperly specified;[44] (4) my methods for showing common impact to Direct Purchasers are purportedly deficient;[45] and (5) my pass-through regression model is purportedly flawed and fails to account for retailer pricing strategies.[46] I note that Dr. Haider does not specifically critique my methodology for calculating but-for Pork output levels, or my methodology for calculating aggregate damages to the Class. Presumably, because these two analyses use the output of my overcharge model as an input, she would disagree with the figures these analyses produce (if not their method of calculation).

23. Below, I respond to Dr. Haider's relevant arguments in the order she advances them. Before diving into the details, I should note that most of Dr. Haider's criticisms of my proposed class-wide methodologies are with their specific *implementation* rather than with the underlying *framework* of the methodology.[47] In other words, Dr. Haider does not contend that the multiple-regression methodology I propose to estimate Pork overcharges is standard and commonly used in antitrust analysis; instead, her criticism is that my model should have used a different definition for my conduct period variable,[48] or included an additional dummy variable for the year 2008,[49] or used an alternative measure of hog costs.[50] Accordingly, her arguments against common impact are largely common to the class. While these modeling choices are important and significant for

[41] Haider Report ¶8.
[42] Haider Report ¶10.
[43] Haider Report Part V.
[44] Haider Report Part VI.A though Part VI.C.
[45] Haider Report Part VI.D through Part VI.F.
[46] Haider Report Part VIII.
[47] The exception to this is Dr. Haider's criticism of the In-Sample Prediction method for determining common impact.
[48] Haider Report Part VI.B.
[49] Haider Report Part VI.C.1.
[50] Haider Report Part VI.C.2.

appropriately analyzing the data in this case, they do not undermine my conclusion that quantitative evidence and methods can be used to show widespread impact to the class.

## A. Dr. Haider's Novel Theories on "But-For Analyses," "Control," and "Export" Arguments Make No Difference in Determining Class Wide Impact

24. The arguments Dr. Haider advances in Part V of her report all pertain to methodologies that I allegedly failed to present in my Class Certification Report, as opposed to rebuttals to the methodologies that I did offer. In this section, I review Dr. Haider's novel arguments and explain why they have no bearing on the analyses and opinions in my Class Certification Report.

### 1. No Separate Analysis of But-For Sow Herds, Hog Slaughter, Hog Capacity, and Exports is Required.

25. In the introduction to Part V of her report, Dr. Haider argues that I should have analyzed but-for Pork output flowing from each of the specific "alleged actions" of the Challenged Conduct (reduction in herds, exports, slaughter capacity). Similarly, she argues that I should have estimated the but-for levels of each of these "alleged actions" absent the Challenged Conduct. As explained below, neither argument has merit. My analysis of the Challenged Conduct as a whole is the correct lens of analysis.

#### a. *Output "But-For" Each "Alleged Action"*

26. In my Class Certification Report, I explained that a monopolist seller (or a cartel behaving as a monopolist) can artificially raise prices by reducing output in a market. I further explained that a monopolist can reduce output from competitive levels in a variety of ways (or "actions"), "such as (A) closing production facilities, (B) running facilities below their maximum capacity (either by reducing input purchases or by fiat), (C) ceasing further expansion plans in the face of growing demand, or (D) finding other uses for the product that keeps it off the primary market."[51] In my initial report, I determined that "the evidence suggests that Defendants artificially lowered the supply of Class Pork Products available to Class Members through a combination of methods."[52] I then estimated the aggregate amount of output reduction: After I used regression analysis to estimate the price effect (overcharge) associated with the Challenged Conduct, I used the overcharge percentage to estimate "but-for" domestic output of Pork, as a movement along the demand curve, which shows that the domestic output of Pork would have been 3.5 to 4.5 million pounds higher during the Class Period "but-for" the Challenged Conduct.[53] As Dr. Haider testified in this case, "overcharge models typically look at price as a function of various

[51] Singer Report ¶38.
[52] *Id.*
[53] Singer Report Part IV.B "The Challenged Conduct Reduced the Domestic Quantity of Pork." *Id.* Table 15.

demand and supply factors" and "price and quantity for a given product" are "jointly determined," because they "are a function of the supply and demand factors… .You have a supply -- supply curve, demand curve and what comes out of it is the equilibrium price and equilibrium quantity at the same time."[54] Expanding on my initial report, I also use the overcharge percentage to estimate positive "but-for" domestic output of Pork for each year of the Conduct Period (including the Class Period).

[54] Haider Dep. at 216:14-25.

27. Dr. Haider believes this calculation of but-for Pork output is insufficient. She claims I am further required to separately determine the output reduction owing to each of the "alleged actions" of the conspiracy—herd reduction, slaughter capacity, and exports. Specifically, she alleges that I failed to propose a methodology to "establish what the supply of pork would have been *absent each alleged action* during the alleged conduct period … Instead … [I] put forward an overcharge methodology that assumes that a combination of these alleged actions somehow resulted in a uniform price effect."[55] Presumably, this would allow the factfinder to attribute what percentage of the entire output reduction was caused by each of the three "actions." I did not propose a methodology for measuring each of the "alleged actions" in isolation, because these analyses are not relevant to assessing Plaintiffs' theory of harm.

28. Dr, Haider confuses *tactics* in support of the alleged conspiracy with the conspiracy itself: An alleged agreement among rival producers of Pork to restrain trade. Unlike the *Behrend v. Comcast* case, in which Plaintiffs asserted (at least) two distinct restraints of trade—vertical restraints on upstream programmers and horizontal restraints on downstream cable operator competitors—there are not multiple restraints alleged here.[56] Instead, there is a single, overarching alleged (horizontal) conspiracy. Hence, no decomposition of damages is needed.

29. Plaintiffs do not allege three separate conspiracies. They allege a single conspiracy to "fix, raise, maintain and stabilize pork prices."[57] Accordingly, I follow the standard practice in antitrust economics of estimating "but-for" *price* (and output) of the product in question, Pork.[58] Dr. Haider faults me for failing to decompose the output effect

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[55] Haider Report ¶51 (emphasis mine). ("Despite the fact that Class Plaintiffs allege different actions that varied considerably over time and across Defendants, Class Experts propose no methodology to establish what the supply of pork would have been absent each alleged action during the alleged conduct period (let alone during the proposed class period). Instead, as I describe later in my report, they put forward an overcharge methodology that assumes that a combination of these alleged actions somehow resulted in a uniform price effect on Direct Purchasers over the nine and-half-year alleged conduct period.").

[56] Hal Singer & Kevin Caves, *Life After Comcast: The Economist's Obligation to Decompose Damages Across Theories of Harm*, ABA'S ANTITRUST (2014).

[57] Singer Report ¶2 (*citing* Consumer Indirect Purchaser Plaintiffs' Fourth Amended Consolidated Class Action Complaint, In Re Pork Antitrust Litigation, Case No. 18-cv-1776 JRT/JFD, filed January 12, 2022, ¶6).

[58] *See, e.g.,* Singer Report ¶144 n. 289 (citing Theon van Dijk and Frank Verboven, *Quantification of Damages*, 3 ISSUES IN COMPETITION LAW AND POLICY 2331–2348, 2335 (2008) [hereafter Dijk and Verboven (2008)] ("The before-and-after method. In this method the prices that prevailed before and after the collusive period are used to estimate the *prices* that would have emerged during the collusive period had the collusion not taken place.")). *Id. at* 2332 ("The pass-on effect reflects the extent to which the purchaser can shift the burden of the *price* overcharge to its customers. The output effect refers to the *sales that may be lost* when part of the price

owing to each "action" that enabled the conspiracy, as if each "action" is a separate restraint of trade, but she does not explain why this is relevant, nor does she cite to any authority that this analysis should be performed.[59] As I am not aware of any authority and Dr. Haider cites to none, it appears that Dr. Haider either invented this requirement from whole cloth or confused it with the evidentiary burdens from *Comcast*.[60] While such analyses could be performed as an academic exercise, they would have no bearing on determining the relevant effects of the alleged conspiracy.

### b. *"But-For" Levels of Each "Alleged Action"*

30. Dr. Haider's second argument is that I am required to determine the "but-for" levels of the "alleged actions"—herd reduction, slaughter capacity, and exports. Specifically, because I did not assess how "sow herds, hog slaughter and slaughter capacity, and exports [would manifest] in the but-for world," I am allegedly unable to "distinguish between conspiratorial and non-conspiratorial factors affecting the three elements of supply."[61] This is also wrong. Again, *actions* in support of an alleged conspiracy do not constitute separate *restraints*. There is no burden for me to analyze these but-for levels separately, nor would doing so yield any incremental information for Class-wide impact.

31. Further, I precisely control for the "conspiratorial and non-conspiratorial factors" that affect the price of Pork in my impact regression. The regression model in my initial report estimates the price overcharge owing to the Challenged Conduct by

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overcharge is passed on to the customers."). *See also* PROOF OF CONSPIRACY UNDER FEDERAL ANTITRUST LAWS, 224 (American Bar Association 2010) [hereafter ABA PROOF OF CONSPIRACY] (discussing using regression analysis to interpret "evidence that that defendants worked together to raise *prices*, restrain *supply*, or otherwise increase profitability by reducing competition) (emphasis mine).

[59] Haider Report ¶79 (citing Singer Dep. at 63:4-18 ("What I haven't done is, once my model generates the output effect…What my model doesn't do is then take a step forward and say, okay, of that reduced output, I can tell you that X percent is coming from increased exports, Y percent is coming from…harvest reduction, and Z percent is coming from...increased liquidation. I don't do that. I don't do such a decomposition.")).

[60] At deposition, Dr. Haider was unable to articulate where this requirement comes from. Her proffered footnote at deposition (to the *Litigation Services Handbook*) is a comment about the use of control variables in a regression generally. It is not relevant to the issue of analyzing "but-for" levels of the alleged actions. Haider Dep. 220:19-25, 221:1-6.

[61] Haider Report ¶52. ("As they acknowledged in deposition, they conduct no assessment of sow herds, hog slaughter, and slaughter capacity and exports in the but-for world (i.e., absent the alleged conduct). They do not consider non-conspiratorial factors that affected Defendants' decisions with respect to each of these elements of supply, including industry events, actions from third parties, and circumstances that were beyond Defendants' control. As such, Class Experts fail to distinguish between conspiratorial and non-conspiratorial factors affecting the three elements of supply that Class Plaintiffs reference in their Complaints.").

controlling for all other competitive supply and demand factors that influence the price of Pork.[62] The "but-for" analyses Dr. Haider describes are simply unrelated to the estimation of a price overcharge, impact, or damages.

**2. Defendants Did "Control" The Supply of Hogs**

32. Part II of my initial report demonstrates that Defendants collectively wield monopoly power over Pork, the product in question for this case. Dr. Haider does not dispute my characterization of the Pork industry, nor my finding that Defendants collectively wield monopoly power. Instead, Dr. Haider makes the extraordinary claim that my analysis of the "industry characteristics of pork processing" was "an attempt to sidestep [my] failure to assess hog supply."[63] Dr. Haider's claim is both backwards and wrong. The relevant antitrust market at issue is the market for Pork products—not hogs—owing to Defendants' alleged price fixing conspiracy in the market for *Pork*. That is why I studied the pork processing industry in my initial report (Part I) and Defendants collective monopoly power over Pork (Part II). Furthermore, I *do* "assess" (control for) hog supply when I empirically test for overcharges in Part IV of my report, by controlling for the costs of hogs over time.[64]

33. Rather than address the relevant antitrust market of Pork products, Dr. Haider spends the majority of Part V of her report opining that "Defendants did not control the supply of hogs."[65] This is a distraction and not relevant to the case. As a matter of economics, in the market for Pork a *monopolist* producer of Pork (the output) reduces the output and raises the price of Pork *regardless of the situation* in the hog (the input) market. Textbook economics on Industrial Organization show that a *monopoly* producer of a product (Pork) will decrease output relative to a competitive market, full stop.[66] There is

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[62] Singer Report ¶¶145–156.

[63] Haider Report ¶77 ("Notably, in an attempt to sidestep their failure to assess hog supply, Class Experts list industry characteristics of pork processing. For example, they refer to industry concentration in pork processing but do not address the lack of concentration in hog supply. Similarly, they refer to barriers to entry within pork processing, but do not assess the ability of independent hog producers to replace sow reductions from some Defendants").

[64] Singer Report ¶153 ("I control for the cost of the pig itself. I use data compiled by Iowa State University that reports, on a monthly basis, the average cost of producing a 270-pound finished pig. These data account for the changing costs of animal feed (composed of ingredients such as the cost of corn and soybean meal), as well as nonfeed costs (variable and fixed) across time for a 'rank-and-file Iowa producer.'").

[65] Haider Report ¶51.

[66] DENNIS CARLTON & JEFFREY PERLOFF, MODERN INDUSTRIAL ORGANIZATION, 92 (Pearson 4th ed. 2005) [hereafter MODERN IO] ("The profit-maximizing monopoly output, Qm, is smaller than the competitive output, Qc, determined by the intersection of the demand curve with the marginal cost curve (which we assume would be the supply curve if the market were competitive) at price pc. The monopoly does *not* have a supply curve that can be specified solely as a function

nothing conditional on the state of the upstream market. Whether Defendants also "control" hogs (however defined) has no bearing on any of my empirical analyses.

34. Nevertheless, Dr. Haider' assertion that Defendants have "no control" over hogs is still wrong and must be addressed. As evidence of this lack of "control," she points to how the majority of U.S. hog supply was provided by third-parties,[67] how Defendants account for a small share of flat-or-growing sow inventories,[68] and the marketing contracts used by Defendants to source hogs from independents are *not* a mechanism to control the supply of hogs.[69] She then faults me for allegedly failing to propose a model to assess sow inventory or hog supply in the but-for world.[70] Even if all of Dr. Haider's individual points were true, this still would not mean that Defendants had zero "control" over the input market.

35. The term "control" as it pertains to Defendants' activity in the upstream market of hogs can have multiple meanings in economics. The first meaning of "control" is that Defendants could collectively *influence* the quantity and prices of hogs via their purchasing decisions. As the main purchaser of U.S. hogs, if Defendants collectively sought to reduce the production of Pork products (for any reason), their demand for hogs (the primary input) would fall. A falling demand for hogs would decrease both the price of hogs and the quantity produced, implying that Defendants' Pork production decisions do "control" upstream prices and quantities. The second meaning of "control" is that Defendants had literal *ownership* of hog raising operations, what economists term "vertical integration."[71] The third meaning of "control" is that that Defendants could exert *influence over nonprice terms* when purchasing of hogs, what economists term "vertical restraints."[72] The final meaning of "control" is that Defendants wielded *monopsony power* in the upstream input market—which could occur independently of vertical integration or restraints—which would give them monopsony power over the purchase of hogs. Dr.

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of price because the monopoly's output depends on marginal revenue (which depends on the slope of the demand curve) and marginal cost.").

[67] Haider Report Part V.A.1.

[68] Haider Report Part V.A.2.

[69] Haider Report Part V.A.3.

[70] Haider Report Part V.A.4.

[71] Haider Report ¶54. (Dr. Haider writes that "the majority of sow inventory and hog supply was from non-Defendant hog producers and Defendants did not control the supply of hogs"). MODERN IO at 395 ("A firm that participates in more than one successive stage of the production or distribution of goods or services is vertically integrated. Nonvertically integrated firms buy the inputs or services they need for their production or distribution processes from other firms. A nonintegrated firm may write long-term binding contracts with the firms with which it deals, in which it specifies not only price, but also other terms or forms of behavior. Contractual restraints on nonprice terms are called vertical restrictions (or restraints).").

[72] Haider Report ¶64. (Dr. Haider writes that "Defendants do not control the supply of hogs through long-term marketing contracts with hog producers"). MODERN IO at 395.

Haider makes no direct arguments regarding Defendants' *monopsony power* over hogs. Below, I separate the first three issues (influence, vertical integration, and vertical restraint) and show how Defendants can still "control" (that is, influence prices and output) hog production even if they did not own any hogs.

### a. *Monopoly Power Over Pork Influences Upstream Hog Prices and Quantities*

36. A *monopoly* producer of a product (Pork) will decrease output relative to a competitive market.[73] This is because a monopoly producer of Pork "controls" the supply of hogs through the price system. The price of hogs is determined by the intersection of the demand curve for hogs (processors collective willingness to buy certain quantities of hogs at certain prices) and the supply curve for hogs (farmers' collective willingness to produce certain quantities of hogs at certain prices). Because output is a function of the number of inputs consumed by a firm, it follows that a monopolist purchaser will procure fewer inputs—that is, if a monopolist of Pork decided to produce half as much Pork, they would purchase approximately half as many hogs.

37. If the downstream market for Pork becomes monopolized, the monopoly Pork producer will seek to produce Pork where the marginal revenue for the last unit of Pork sold equals its marginal cost of production.[74] This is a lower quantity of pork than in competition. This lowers the quantity of inputs the monopolist needs. Because hogs are *the* primary input for Pork (you cannot substitute hogs for any other animal, unlike substituting aluminum for copper in wiring), this lowers the demand for hogs. If the demand for hogs falls, hog prices will temporarily fall (and then stabilize where price is equal to average cost) and the overall quantity of hogs produce will be permanently reduced.[75]

38. All of this is to say that Defendants "control" hogs via their willingness to purchase them. Independent farmers make hog production decisions based on the expected prices they will receive for certain quantities of hogs. Defendants, acting collectively as a monopoly Pork processor, do not need to literally *own* the herds to "control" the number of hogs that are produced. Instead, they signal their willingness to pay for certain quantities of hogs to upstream farmers, and hogs are farrowed based on these future expectations.

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[73] MODERN IO at 92 ("The profit-maximizing monopoly output, Qm, is smaller than the competitive output, Qc, determined by the intersection of the demand curve with the marginal cost curve (which we assume would be the supply curve if the market were competitive) at price pc. The monopoly does *not* have a supply curve that can be specified solely as a function of price because the monopoly's output depends on marginal revenue (which depends on the slope of the demand curve) and marginal cost.").

[74] MODERN IO at 91.

[75] MODERN IO at 90. The long-run supply and price of hogs is determined by the *minimum average cost* of producing hogs across multiple farmers. In the short run, rapidly expanding or decreasing production over-or under-taxes the fixed capital, so the supply curve is upward sloping.

### b. *Defendants' "Control" Via Vertical Integration*

39. Dr. Haider's analysis of USDA data shows that Pork packers "only" owned approximately 30 percent of all hogs processed during the class period.[76] Moreover, this figure does not even factor in Triumph, which as Dr. Haider admits purchases 73 of its hogs from its own member producers.[77] Because Triumph is owned *by its member hog farmers* it is vertically integrated *downward* (the hog farmers own the processor) rather than *upward* (the processor owns the hog farms).[78] She also shows that some Defendants (such as Seaboard and Smithfield) directly owned more of their hogs than other processors.[79] What she does not do is explain how either fact is relevant to the study of monopoly power in the Pork market, given that my regression model directly accounts for hog production decisions by including hog cost as a control variable.[80]

40. As explained above, direct control over an input is not necessary to successfully operate a downstream monopoly. This is because the vertical integration has *no direct effect* on the profit-maximizing input quantities for the firm to obtain.[81] Only the presence or absence of *market power* affects the optimal input quantities for a firm to purchase.[82] A firm can have market power and not be vertically integrated (a coffee

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[76] Haider Report ¶60 ("As shown in Exhibit 3 above, vertical integration by pork processors in upstream hog production is limited. Pork processors (including Defendants) own only about one-third of the total hogs they slaughter, and the remaining two-thirds are purchased by the processors from independent hog producers.").

[77] Haider Report ¶60.

[78] *About Us,* TRIUMPH FOODS, (accessed November 2022), *available at* https://www.triumphfoods.com/about/. ("Triumph Foods is one of the few processing **facilities completely owned by its producers**. This means our producers – the suppliers of our hogs – are invested in quality, well-being, and safety, just like we are.") (emphasis added).

[79] Haider Report ¶60.

[80] Haider Report ¶56. Dr. Haider writes "Class Experts propose no methodology to distinguish any reduction in hog supply resulting from Defendants' alleged agreement from reductions resulting from non-conspiratorial factors … and thus fail to isolate changes in hog supply resulting from the alleged agreement from changes in hog supply resulting from supply and demand factors." *Id* at 71 ("Because Class Experts do not account for the supply decisions of independent hog producers, their regression models are incapable of isolating the effects, if any, of Defendants' alleged agreement on pork prices."). As I explain in Part II.A.2 above, Dr. Haider is conflating my regression analysis (which does control for supply and demand factors) with unrelated analyses.

[81] MODERN IO at 399–400 (listing the benefits of vertical integration as "1. Lower transportation costs[.] 2. Assure supply[.] 3. Correct market failure[.] 4. Avoid government rules[.] 5. Gain market power[.] 6. Eliminate market power").

[82] MODERN IO at 108 ("The marginal cost to a monopsony of buying additional units [] is described by a marginal outlay schedule, which is analogous to a marginal revenue curve. [] A profit-maximizing monopsony [purchases at Qm] where its marginal benefit, as given by its demand curve, equals its marginal") equals its marginal outlay. Because the marginal outlay curve

company purchasing beans from independent farmers in a remote area has monopsony power if it is the sole purchaser), and a fully vertically integrated firm can have no market power at all (Delta infamously purchased an oil refinery, which conferred it zero market power, since there were many other producers and buyers of jet fuel).[83] In this case, it is very likely that Defendants, which collectively account for 80 percent of hog slaughtering capacity (and thus approximately 80 percent of hog purchases),[84] enjoy some degree of monopsony power.

41. What vertical integration determines is *how* the optimal quantity of inputs for a firm are sourced. In a competitive market, an integrated firm will buy its quantity from third parties, paying the third parties the prevailing market price. If vertically integrated, a firm will produce the quantity itself, paying its factors of production their marginal revenue product.[85] Absent special synergies from integration, there is no reason why a vertically integrated firm would produce inputs cheaper than arms-length firms.[86] In either event, the firm outlays money to receive an optimal quantity of inputs. Economists recognize that vertical integration can sometimes avoid the problem of "double

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lies above the supply curve, the monopsony hire fewer workers, [Qm] than would a competitive market, which hires [Qc] workers (determined by the intersection of the demand curve and the supply curve.").

[83] Clifford Krauss and Niraj Chokshi, *Delta Air Lines Bought an Oil Refinery. It Didn't Go as Planned,* NEW YORK TIMES (Aug. 10, 2020) *available at* https://www.nytimes.com/2020/08/10/business/energy-environment/delta-oil-refinery-jet-fuel.html#:~:text=an%20Oil%20Refinery.-,It%20Didn%27t%20Go%20as%20Planned.,trouble%20even%20before%20the%20pandemic.

[84] I have not seen any evidence in the record that U.S. grown hogs have any other commercial use other than slaughter for Pork. I also understand that the export of live hogs is limited, and that most hogs grown in the United States are slaughtered in the United States. According to data from the USDA, 117,199,917 hogs were slaughtered annually on average from 2009-2020, while only 41,977 live hogs were exported. This means that less than 0.04% of hogs raised in the U.S. were exported, meaning virtually all hogs raised in the United States were slaughtered in the United States. See my workpapers for details.

[85] N. GREGORY MANKIW, PRINCIPLES OF MICROECONOMICS, 365–366 (Cengage Learning 8th ed 2018) [hereafter MANKIW] ("Economists sometimes call this column of numbers the firm's marginal revenue product: It is the extra revenue the firm gets from hiring an additional unit of a factor of production … . Thus, *a competitive, profit-maximizing firm hires workers up to the point at which the value of the marginal product of labor equals the wage*).").

[86] While the vertically integrated firm would "save" on *accounting profits* from producing internally, its *economic profits* (which account for the opportunity cost of capital) are unchanged. For example, (and ignoring taxes) an integrated firm could spend $100 to buy a supplier, which would save it $5 per year on expenses, while an unintegrated firm could use that same $100 on a different investment, which would generate it $5 per year in revenue. *See* MANKIW at 250–251.

marginalization" or "double monopoly markups," but this edge case would only occur if the input market is also monopolized, which is not the case here.[87]

### c. *Defendants' "Control" Via Vertical Restraints*

42. Both Dr. Haider and Dr. Mintert make the claim that "hog contracts" do not give Defendants' control over the hog market. Because these claims are similar, I address both here.

43. Dr. Haider critiques Dr. Magnum's and Dr. Williams's opinions that Defendants "controlled" the hog production process via long term contracts with hog producers.[88] Dr. Haider reviews some of these contracts and find that they typically "specify purchase volumes," and serve to "ensure a steady supply of hogs" but do not require exclusivity.[89] Dr. Mintert makes a similar claim that independent farmers truly control the hog market.[90] He shows in Exhibit 2 of his report that Pork processors directly owned approximately [redacted] percent of all hogs slaughtered, that [redacted] percent were sold and slaughtered via a "marketing contract" from an independent farmer, and that *only* [redacted] *percent* were sold and slaughtered in the "spot market," or a negotiated transaction outside of a contract.[91] Thus, Dr. Mintert's own analysis shows that the vast majority of all hogs sold in the U.S. were owned directly by or raised in accordance with a pork processor contract (orange and blue below) while only a fraction were sold in a spot market (green below). I reproduce Dr. Minter's Exhibit 2 below.

[87] MODERN IO at 415-419 (discussing the use of vertical restrictions to avoid double markets in the case of two "successive monopolies.").
[88] Haider Report ¶¶64–70.
[89] Haider Report ¶¶67–70.
[90] Mintert Report ¶¶46–48.
[91] Mintert Report Exhibit 2. Figures from Dr. Mintert's Exhibit 2 backup.

FIGURE 1: DR. MINTERT'S EXHIBIT 2
BARROWS/GILTS SLAUGHTERED BY PURCHASE TYPE

44. Dr. Mintert claims that because [redacted] percent of hog slaughter (the orange shaded area) occurred using a "marketing contract" between an independent farmer and a processor, Defendants do not have "control" over how many hogs farmers raise.[92] This is backwards. These contracts contain *textbook terms and conditions* that "vertically restrain" the production of hogs. Hog production contracts give Pork processors explicit control over how hogs are raised, fed, and delivered. Because [redacted] percent of hogs are sold under these contracts, essentially [redacted] percent of the hog market is effectively "vertically restrained." Defendants themselves considered these contracts as [redacted][93] Paired with the 3[redacted] percent of hogs that are vertically integrated by pork processors (the blue shaded

[92] Mintert Report ¶¶48.

[93] Clemens describes itself as [redacted]. D. Clemens Depo. at 28:16-22. Tyson commented in 2012 that the industry was becoming [redacted] TF-P-000743209.

areas), this means that pork processors could directly influence [redacted] *percent of hog production* through vertical integration or vertical restraints during the Class Period.

45. I researched the terms of these contracts and find that they align with what economists consider "vertically restraining." According to the contract terms provided by the Agricultural Marketing Service of the United States Department of Agriculture, processors and farmers agree to provisions relating to farm facility investments and the technical specifications of the pig, the type of feed to be used, hog delivery dates, and other contractual obligations which "restrain" farmers in their hog growing behavior.[94] One example from the USDA Swine Packer Marketing Contract Summary is a requirement that sellers raise swine with "certain genetics providing meat quality characteristics" and outline specific genetic strains and weights of hogs that are acceptable to raise.[95] The capital investments that sellers may be contractually obligated to make can be substantial.[96] Further, the contracts can restrict sellers from making material changes to their production facilities.[97] Restraints based on nutritional specifications can also be placed on sellers, ranging from the level of iodine found in a hog, to the pH value of the hog, to nutritional schedules.[98]

46. Furthermore, the USDA agrees that these marketing contracts are vertically restraining. [redacted][100]

47. In sum, all of the record evidence is that Defendants had ample ability to "influence" and "control" what occurred in the upstream hog market. If not from

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[94] *Swine Packer Marketing Contract Summary – National Other Provisions,* AGRICULTURAL MARKETING SURVEY (accessed Oct. 12, 2022), *available at* https://www.ams.usda.gov/sites/default/files/media/SCLCSROP.pdf.

[95] *Id.* at 61 (One seller was required to "…use its best efforts to install open pen gestation systems for 5000 of seller's sow herd by the third annual anniversary of the date of this agreement, with the installation to occur on a prorata basis during the initial three (3) years of this agreement.").

[96] *Id.* at 62.

[97] *Id.* at 60 ("There will be no material change in respect to the location, management practices, or operation of the facilities without the prior written consent of buyer, such consent not to be unreasonably withheld.").

[98] *Id* at 192 ("Seller shall utilize feedstuffs known to produce hogs of a quality desirable to buyer. Seller agrees to adhere to buyer's nutritional guidelines as found in specified schedule and subject to change." *Id* at 189, "Seller shall use its best effort to achieve an iodine value for hogs no greater than 72. Sampled hogs shall on average, over each consecutive 3-month period, be no greater than the maximum iodine value. The current maximum iodine value is 75.").

[99] Deposition of Shayle Shagam (June 1, 2022) at 309:5–310:21.

[100] *Id.*

Defendants' position as a monopoly producer of Pork, then from their substantial vertical integration into hogs and via vertical restraints on third-party hog producers.

### 3. Dr. Haider's Analysis of Capacity or Slaughter Is Not an Analysis of Domestic Supply and Ignores the "But-For" World

48. Dr. Haider devotes Part V.B of her report to making the point that Pork processing capacity and actual slaughter volumes increased over the Conduct Period.[101] Dr. Haider concludes at the end of this section that because capacity and production increased in the Conduct Period, I am somehow incorrect to claim that slaughter capacity and volumes should have been *even higher* absent the Challenged Conduct.[102] This is a logical non-sequitur. Even if it were not, "production" and "capacity" are not relevant metrics for discussing Pork output in the domestic consumer market. Domestic supply is.

49. *First*, Dr. Haider's analyses simply ignore the possibility of the but-for world absent the Challenged Conduct. The relevant question is whether Defendants and Co-Conspirators increased volumes and capacities *at the same rate* as they would have in a competitive but-for world. No monopoly conspiracy requires a complete cession of production increases in a growing market: A mere cooling of expansion relative to a competitive world is sufficient to produce monopoly outcomes. Dr. Haider's own Exhibit 8 illustrates this point. The *rate of Pork production* is demonstrably lower during the Conduct Period than in the benchmark period before it. In Figure 2 below, I use Dr. Haider's exhibit data and simply plot the rate of production increase during the "benchmark period" (2005–2008) compared to the trendline of actual production growth from 2009–2018. The red line shows what total production would have been if growth kept up at its 2005–2008 pace. The green line is the growth trend from the Conduct Period, 2009–2018. The trends unambiguously show that Pork growth was slower during the Conduct Period than the period before it. This is consistent with Plaintiff's allegations.

[101] Haider Report ¶¶78–86.

[102] Haider Report ¶85 ("Accordingly, it is incorrect for Dr. Mangum and Dr. Singer to simply claim that slaughter capacity and pork processing volumes should have been higher during the alleged conduct period. They propose no methodology that distinguishes between allegedly conspiratorial and non-conspiratorial factors and establishes that slaughter capacity would have been higher but for the alleged conduct and that pork processing would have increased at a higher rate than it actually did during the nine-and-a-half-year alleged conduct period.").

FIGURE 2: DR. HAIDER'S EXHIBIT 8 PORK PRODUCTION TRENDS
(MILLIONS OF PORK POUNDS PRODUCED)

50. *Second*, "capacity" or "slaughter" are not the relevant output quantity in this case. The relevant output quantity is the domestic Pork supply. My regression uses domestic Pork prices as the dependent variable.[103] Because the relevant price in this case is domestic Pork prices, the relevant output is domestic Pork quantity. When I project but-for output, I project but-for domestic quantity.[104] This is because when a U.S. consumer goes to purchase a Pork product, the relevant quantity they interact with is the U.S. domestic quantity of pork available. The relevant price they interact with is domestic Pork prices. All else held equal, more Pork quantity lowers Pork prices, and less Pork quantity raises Pork prices.

51. As explained in my initial report, the way to measure the domestic quantity or supply of Pork is using a figure termed "disappearance" or "domestic availability." Domestic availability is the amount of Pork available for consumption in the U.S. market,

[103] Singer Report ¶¶149-150.

[104] Singer Report Part IV.B ("The Challenged Conduct Reduced the Domestic Quantity of Pork").

or the amount that "disappears" in the U.S. market over a given period of time.[105] Domestic availability equals production, net of imports and exports, minus changes in frozen inventory stock.[106] Expressed mathematically:

$$Domestic\ Availbility = Production - Exports + Imports \pm Frozen\ Stock$$

52. Dr. Haider's assertions that capacity and production increased do not tell us what happened to domestic availability. Capacity is simply the maximum theoretical production level. Capacity or production could very well increase in a year. But if that increase is offset by higher exports, the amount of domestic availability could be unchanged. For example, in Figure 6 of my initial report, in the year 2008 Pork production *increased* but domestic availability *fell,* because net exports exceeded the new production.[107] Thus, Dr. Haider's analyses of capacity and production only tell part of the story.[108]

53. Critically, Dr. Haider has nothing to say about the domestic availability of Pork during the Conduct Period. Dr. Haider does not contest that in Figure 6 of my initial report, I showed that U.S. domestic disappearance of Pork *was lower during the Conduct Period overall*, and actually declined in the first years of the Conduct Period as exports rose.[109] Nor does she contend that I cannot use my regression analysis to estimate the but-for domestic availability of Pork absent the Challenged Conduct.[110] Nor does Dr. Haider contest that Defendants routinely tracked "domestic availability" and "domestic disappearance" as a key metric for determining domestic Pork prices.[111] Moreover, Dr. Haider agreed with the economic theory a monopolist would produce lower output

[105] Singer Report ¶129.
[106] Singer Report ¶129 n. 250.
[107] Singer Report Figure 6.
[108] In a footnote in her report, Dr. Haider appears to dispute that "domestic availability" is the relevant output metric. She writes: "I note that Dr. Singer uses the results of his overcharge model (along with his estimate of the demand elasticity for pork) to assert that 'domestic quantity of pork' would have been higher during the alleged conduct period (Singer Report, ¶¶166-167). This, however, is not an analysis of but-for pork production and does not establish that pork production would have been higher absent the alleged conduct." Haider Report ¶79 n. 122. Dr. Haider is correct that my but-for analysis of pork output is focused on the domestic quantity of pork. She is wrong that an analysis of pork production (an *input* to determining the domestic quantity) is the relevant output metric.
[109] Singer Report ¶41; Figure 6.
[110] Singer Report ¶¶ 166-167.
[111] Singer Report ¶¶129-133 ("Defendants Understood That Domestic Supply Restrictions Would Raise Domestic Prices").

compared to a competitive market.[112] Dr. Haider therefore offers no criticisms of my analyses of the actual *output* in this matter, domestic supply.

**4. My Analyses Correctly Account for Export Demand**

54. In Part V.D.1 of her report, Dr. Haider claims that, in my domestic pricing regression, I failed to "account for increases in exports due to increases in world demand for U.S. pork," and that I "propose no methodology to establish an increase in exports resulting from Defendants' alleged conduct."[113] Dr. Haider then lists a number of world events she believes I "overlooked."[114] Defendants' other expert, Dr. Mintert, also provides a list of alleged export factors that he claims "shape[d] demand for U.S. Pork exports during the alleged conspiracy period," and muses that I "failed to consider these important drivers of export demand" in my "analyses and opinions."[115] These criticisms are vacuous. Neither expert explains how, exactly, I should have "accounted" for these alleged factors in my analyses, nor do they empirically demonstrate what effect they may have on any of my analyses. Because Defendants' experts are imprecise in their criticisms, I am forced to divine their meaning.

55. If Defendants' experts are alleging that I should conduct a separate regression of exports (rather than domestic prices) absent the alleged conduct, my response is the same given above in Part II.A.1—namely, that Plaintiffs allege a single conspiracy, and that a decomposition of the alleged actions of a conspiracy is not required nor necessary for the purposes of determining classwide impact and damages using common data and methods.

56. If instead Defendants' experts are alleging that I should have included additional export demand control variables in my domestic pricing regression model, then what Defendants' experts are describing is an alleged "omitted variable" in my regression model.[116] This problem occurs when a variable in a regression model picks up the effect of

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[112] Haider Dep. 303:10-12 ("Q. Do you -- would you agree that economic theory predicts that a profit-maximizing monopolist will have lower output -- output as compared to a market that features multiple -- as compared to a competitive market with multiple participants? A. You know, as a general matter of, you know, yeah, plain economic theory, I agree with that.").

[113] Haider Report ¶96, ¶100.

[114] Haider Report ¶100.

[115] Mintert Report ¶¶152–161.

[116] Dr. Haider raises the issue of omitted variables elsewhere in her footnotes, but not in sections dealing with these export factors. *See, e.g.,* Haider Report ¶90 n. 157. ("The omitted variable bias problem arises when a relevant explanatory variable is excluded from the regression model and that variable is correlated with another explanatory variable in the regression model. *See* JEFFREY M. WOOLDRIDGE, INTRODUCTORY ECONOMETRICS: A MODERN APPROACH, 84–87 (Cengage Learning 7th ed 2002) [hereafter WOOLDRIDGE]. As Professor Wooldridge also explains the issue in an econometrics textbook, "suppose that … we omit a variable that actually belongs in the true (or population) model. This is often called the problem of excluding a relevant variable or underspecifying the model … this problem generally causes the OLS estimators to be biased."

some other variable that was inadvertently "omitted" from the model and that is correlated with both the dependent variable and some other control variable.[117] Presumably, the lists of "export factors" that Dr. Haider and Dr. Mintert propose *might* be a set of potentially omitted variables. If this was their intent, neither expert says so outright, and neither expert tests this by including them in my regression model. I will note that in the recent antitrust case *In re High-Tech Employee*, the court deemed it insufficient for a defendant's economist to simply invoke the specter of omitted variable bias without demonstrating exactly what was omitted from the regression and what effect it had.[118]

57. Furthermore, my regression model *does* account for increased export demand over the long run via a linear time trend and other demand variables that capture demand shifts. The time trend accounts for long-run increase in global demand, just as Dr. Haider contends.[119] In fact, my time trend turns out to be a near perfect proxy for international Pork demand: Dr. Mintert, in his Exhibit 22, proses that trade demand can be measured as the gross national income (GNI) of the top four importers of US pork.[120] This proposed metric is *98 percent* correlated with my time-trend variable, meaning that the time-trend variable is an excellent stand-in for a measurement of Dr. Mintert's proposed measure of "international demand of U.S. Pork."[121]

58. Nevertheless, to put this issue to rest, I construct and test each of the nine "export factors" that Drs. Haider and Mintert allege in their report as additional regression

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[117] *See* Hal Singer and Kevin Caves, *Applied Econometrics: When Can an Omitted Variable Invalidate a Regression?,* THE ANTITRUST SOURCE (2017).

[118] *Id.* at 8 ("The defendants' economists argued in the abstract that the plaintiffs' regression model might suffer from omitted variable bias, which 'arises when some of the same unmeasured common factors drive both the independent and dependent variables.' By invoking omitted variable bias, the defense was asserting that the plaintiffs' measure of the challenged conduct was correlated with some other variable, which the plaintiffs had omitted from their model, and that it was this omitted variable that was actually causing lower compensation to be paid to class members. As the court observed in its class certification order, the defense had failed to specify what the omitted variable might be, or to explain why excluding it from the model would have biased the plaintiffs' regression in the matter claimed by defendants."). *See also* Order Granting Plaintiffs' Supplemental Motion for Class Certification at 56, *In Re: High-Tech Employee Antitrust Litig.*, No. 11-CV-02509 (N.D. Cal. Oct. 24, 2013).

[119] Dr. Haider herself admits that "U.S. pork exports have been on an upward trend since NAFTA went into effect in 1994." Haider Report ¶100.

[120] Mintert Report ¶152. ("Prior to and during the Alleged Conspiracy Period, international demand for U.S. pork grew due to several factors. First, as incomes in developing countries have risen, those consumers have begun to consume and demand more meat, including pork. Exhibit 22 graphs total U.S. pork exports from 1985–2021 along with the growth in per-capita Gross National Income ("GNI") in China, Japan, Mexico, and South Korea.").

[121] *Id.*

controls in my main regression model.[122] While I deny that these variables are appropriate to include in my regression model for a variety of reasons, actually testing these variables just as Defendants' Experts describe them reveal that none of these alleged omitted variables changes the economic or statistical significance of the Conduct variable. Moreover, if one were to include *all nine* proposed variables altogether—including currency strength, gross national income, pork production costs, several trade regulation events, and international swine disease—the coefficient on the Conduct Variable would remain virtually unchanged at 12 percent.[123] While I do not endorse the use of these variables, this test shows that Defendants' Experts' criticisms are entirely without merit and that my model appropriately controls for export demand without additional controls.

### 5. Dr. Haider's Claim That Exports Varied by Defendants and Primal Cut Is Both Based on Incomplete Data and Irrelevant

59. Dr. Haider asserts that exports for various primal cuts from Tyson and Hormel did not increase during the Conduct Period, and that Hormel specifically exported less in the Conduct Period than before it.[124] There are many problems with this claim and Dr. Haider's analysis.

60. To begin, Dr. Haider relied on partial export data for only two Defendants. The two data files used as support for this claim were both produced after the submission date for my initial report, in June and August of 2022, and there is no reason to believe this is a complete record of pork exports. Neither Tyson nor Hormel claim to have provided the entirety of its export data. For example, after providing a single data file with export data, a Hormel representative stated that "Hormel produced data *related* to its exports of pork products yesterday."[125] Dr. Haider uses the entirety of the Hormel data, treating each observation as an export, despite the fact that over 23 percent of the observations list "US" or "USA" as the customer country. Similarly, Tyson only provided export data from two divisions, and no export data was provided regarding the Tyson Fresh Meat divisions "Case Ready/Value Added" or "Smoked Meat," despite the "Case Ready/Value Added" division comprising the second largest volume of commerce in the transactional sales data. This further indicates that the data are incomplete.

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[122] The nine variables are: Export Partner Currency Strength, Export Partner Gross National Income, U.S. Pork Production Cost Advantage, South Korean Foot and Mouth Disease, H1N1 Pork Import Ban, Russia Pork Import Ban, Trade War with Mexico, Trade War with China, and the US Korea Free Trade Agreement. I detail the construction of each of these variables in the Appendix.

[123] The mean coefficient on the conduct is 0.125 and ranges from 0.05 to 0.17.

[124] Haider Report ¶¶102–104.

[125] Exhibit 21, Index of Exhibits to Defendants' Opposition to Certain Direct Action Plaintiffs' Motion to Compel (emphasis added).

61. Dr. Haider then uses this random assortment of data to suggest that Tyson's exports "fluctuated" over time and declined during the alleged conduct period for certain primal cuts. When I look at Dr. Haider's data for Tyson in aggregate, Tyson clearly exported more Pork products during the Conduct Period than before it. This is entirely consistent with Plaintiffs' theory of harm. Figure 3 shows Dr. Haider's export analysis for Tyson in the aggregate, with pre-Conduct and Conduct level export averages.

FIGURE 3: TYSON'S SUPPLEMENTAL PRODUCTION SHOWS EXPORT INCREASES DURING THE CLASS PERIOD

62. Dr. Haider's analysis for Hormel is unavailing. Even if Hormel, which Dr. Haider claims exports less than one percent of its products, exported less during the Conduct Period, this does not mean that Defendants did not use exports to reduce domestic supply, only that Hormel did not do so for these products. None of the evidence Dr. Haider presents, even if correct (it is not), is countervailing evidence against an export strategy to keep Pork off of the domestic market. It does nothing to refute the record evidence I review in my report, which shows that Defendants internally discussed that

[redacted][126]

## B. Dr. Haider's Variant Overcharge and Impact Models Demonstrate Class-Wide Overcharge and Impact

63. In my initial report, I demonstrated using Class wide data and methods that a multiple regression analysis—the standard econometric tool for analyzing relationships between variables—can be used to demonstrate that the Challenged Conduct artificially inflated Class Pork products prices above competitive levels by at least 12.8 percent during the Conduct Period, holding constant other variables.[127] I then use standard methods to show that this overcharge impacted virtual all Direct Purchasers. This "overcharge regression" "controls" for other relevant factors other than the Challenged Conduct that might influence prices. In Table 7 below, I summarize all the "control" or "independent" variables I use in the overcharge regression.

[126] Singer Report ¶42, *citing* SMITHFIELD01071523 at -538-539, [redacted]. *See also* Singer Report ¶¶42-45; 216-222, describing the documentary evidence of using exports to reduce domestic supply and raise domestic prices.

[127] Singer Report Part IV. When expressed as a *reduction,* the regression shows Pork prices would have been approximately 12 percent lower in a world but-for the Challenged Conduct. Singer Report ¶195.

TABLE 7: SUMMARY OF CONTROL VARIABLES IN DR. SINGER'S OVERCHARGE REGRESSION

| Dr. Singer's Regression Variables | Controls For |
|---|---|
| *Total Cost Per 270lb Pig* | Corn, soy, other feed; farm labor, farm capital, interest rates, transportation, fuel, vet costs, etc. |
| *Plant Cost Per Lb* | Plant labor, supervision, packaging, plant supplies, maintenance, ice, utilities, depreciation, regulatory costs, freezer costs. |
| *Piglet Loss Rate (6 Month)* | Piglet morality rates, Circovirus vaccine. |
| *Bacon Ingredient Index (For Bacon Only)* | Bacon-specific ingredient costs (salt and spices). |
| *Swine Flu Flag* | H1N1 shock in consumer demand. |
| *Beef-Chicken Index* | The relative prices of chicken and beef, barometer for consumer food prices. |
| *Number of Pork Recalls Active* | Consumer demand following recalls. |
| *Real GDP Per Capita* | Consumer demand, labor productivity, standard of living, national economic shocks. |
| *Trend* | Long run trends: Technology, productivity, export demand. |
| *Cut-By-Month Seasonality* | Seasonal prices, primal cut pricing differences. |
| *Processor Fixed Effects* | Individual Defendant characteristics. |
| *Product Fixed Effects* | Individual Pork product characteristics. |
| *Customer Type Fixed Effects* | Direct Purchaser category (distributor, retail, etc.) |
| *Customer ID Fixed Effects* | Individual Direct Purchaser characteristics. |

64. The arguments Dr. Haider advances in Part VI of her report all pertain to my overcharge regression and my analyses showing that these price overcharges impacted virtually all Direct Purchasers. Dr. Haider's criticisms of my proposed class-wide methodologies in this section (except for the in-sample prediction method) are with their specific *implementation* rather than with the underlying *framework* of the methodology.

65. Dr. Haider proposes several modeling variations to my analyses. Critically, Dr. Haider's own direct-purchaser overcharge model still finds economically and statistically significant overcharges due to the Challenged Conduct, and even her own analysis of pricing structure shows economically and statistically significant correlations between prices. As I demonstrated in Table 1 above, Dr. Haider's rebuttal analyses, even if taken at face value, demonstrate Class wide overcharges and impact.

66. Nevertheless, Dr. Haider's modeling variations should not be taken at face value, as her proposed changes flout well-established econometric practices and, in one case, result in a problem called "simultaneity bias" that renders her variant regression un-interpretable. Below, I describe the problems with Dr. Haider's modeling variants, explain

why my own methods were correct, and demonstrate other alternative methods superior to those Dr. Haider proposes for answering the questions she raises.

### 1. Dr. Haider's Redefinition of the Conduct Period Is an Academically Condemned Econometric Practice

67. In Part VI.B of her report, Dr. Haider claims that my overcharge regression "fail[s] to measure the effects of Defendants' alleged conduct during the proposed class period" because it measures "the entire alleged **conduct period** from January 2009 through June 2018" rather than the **Class Period** between July 2014 and June 2018.[128] Dr. Haider claims (without citing *any* authority or literature) that "[a] model that simply calculates a single average overcharge over a nine-and-a-half-year period, despite claims that Defendants' alleged conduct varied considerably at different points in time, is not designed to isolate the effects of the alleged conspiracy."[129] She further claims that it "is certainly not designed to measure the effects of the alleged conspiracy during the last four years of the alleged conduct period."[130]

68. Dr. Haider then proposes her own overcharge regression model which redefines the Conduct Period (2009-2018) to only measure the Class Period (2014-2018).[131] Under this formulation, she finds that the price overcharge was lower, but still economically and statistically significant.[132] In her base formulation, she finds economically and statistically significant price overcharges of 0.4 percent using Defendants' sales data, and overcharges of 4.2 percent using the USDA data.[133] In a formulation that also includes hog prices as an independent variable, she finds that the price overcharge was 2.9 percent using Defendants' data.[134] That is, even taking Dr. Haider's modification at face value, she still shows econometric evidence of price overcharges during the Class Period.

69. In any event, Dr. Haider's modification of the Conduct variable is a grave econometric error. The economic literature makes clear that introducing arbitrarily designated structural breaks without an *a priori* basis is "hardly an example of sound scientific practice."[135] Although I do not endorse methods that decompose the effect of the Conduct over time (as the allegations are for a *single conspiracy* spanning a nine-year

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[128] Haider Report ¶108, (emphasis mine).
[129] *Id.*
[130] *Id.*
[131] Note that roughly half of all Conduct observations (48.9%) occur in the Class Period.
[132] Haider Report ¶¶106–113.
[133] Haider Report Exhibit 14.
[134] Haider Report Exhibit 22. Dr. Haider does not use the USDA data for this analysis, as her weighting is specific to individual Defendants' sales.
[135] Bruce Hansen, *The New Econometrics of Structural Change: Dating Breaks in U.S. Labor Productivity*, 15(4) JOURNAL OF ECONOMIC PERSPECTIVES 117-128, 118 (2001).

period and the academic literature supports using a single conduct coefficient), if that knowledge is of any value to the Court, I demonstrate a more economically sound method to determine how the overcharge may have varied over time.

**a. *My Method Is Supported by the Economic and Antitrust Literature, and Dr. Haider's Method is Directly Refuted by It***

70. Dr. Haider's claims that my model "is not designed to isolate the effects of the alleged conspiracy"[136] is unambiguously rejected by the literature, as is her related claim that "[t]here is no economic justification for this approach."[137] It is telling that Dr. Haider offers no citations to back up these claims. In contrast, I cite four antitrust and competition economic authorities in my initial report, all of which show in no uncertain terms that my method of determining the effect of the alleged conspiracy via a benchmark and conduct period model is the gold standard.

71. For example, in my initial report I cited Professors Jonathan Baker and Daniel Rubinfeld, two prominent antitrust economists, to establish that multiple regression analysis allows the court to determine whether the Conduct Period is economically and statistically associated with higher prices, after accounting for competitive factors.[138] Critically, that text explicitly endorses my construction of the Conduct variable equal to "one" for the duration of the Conduct Period (not the Class Period), and "zero" otherwise:[139]

> Reduced form equations are **perhaps the most commonly employed in price-fixing case**s. In this litigation setting, the goal is typically to deter- mine whether and how much prices rose as a result of the alleged cartel, as a basis for finding liability and measuring damages. This can be accomplished by estimating a reduced form price equation, controlling to the

[136] Haider Report ¶108.

[137] Haider Report ¶109 ("Each of the Class Experts estimates a single overcharge (by cut or for all cuts combined) for the nine-and-a-half-year period from January 2009 through June 2018; they fail to assess overcharges specifically for the proposed class period. In doing so, their approach assumes that the effects of the alleged conduct (i.e., their estimated overcharges) were uniform throughout the alleged conduct period that spans nine and a half years. There is no economic justification for this approach.").

[138] Singer Report ¶145 (*citing* Johnathan Baker & Daniel Rubinfeld, *Empirical Methods in Antitrust Litigation: Review and Critique,* 1 AMERICAN LAW AND ECONOMICS REVIEW 386–435, 388 (1999) ("Empirical methods can help courts identify what happened and why. This can often be accomplished through a multiple regression analysis that distinguishes among a number of competing factors that were correlated with a fact pattern - allowing the court to isolate a key relationship or critical influence using models that describe the statistical relationship between one variable and a number of others.")).

[139] *Id.* at 392 (emphasis added).

> extent possible for fluctuations in cost and demand that might affect price. **The price effect of the alleged conspiracy is measured by the coefficient on a dummy variable that takes on the value of one during the period (or in the markets) in which the conspiracy is in operation.**

Professor Rubinfeld also explicitly endorses this construction in his chapter in the American Bar Association's PROOF OF CONSPIRACY UNDER FEDERAL ANTITRUST LAWS, which I cite in my initial report:[140]

> When the necessary data are available, formal statistical models can be a valuable supplement to other types of economic analysis. Regression methods allow the economist rigorously to control for the effects of other factors and isolate the effect of the variable of interest… For instance, an economist may model price as a function of determinant of demand, costs, market structure, government regulation, **and a dummy variable for the possible existence of a conspiracy[.]**

Similarly, in my initial report I cite the competition economists Theon van Dijk and Frank Verboven, who write that:[141]

> To the extent that cartel prices differ in a statistically significant way from the pre- and postcartel prices, it may be possible to attribute the difference to collusion. **The before-and-after approach is usually implemented within a multiple regression framework in which one estimates the price over the entire period (conspiracy and benchmark period) and includes an indictor (or "dummy") variable that is equal to one during the conspiracy period and zero otherwise.** The estimated coefficient associated with this dummy variable then measures the amount of the price overcharge.

Finally, Professors Robert Marshall and Leslie Marx write in *The Economics of Collusion* that an econometrician should "use the benchmark period, where it is assumed that the

[140] Singer Report ¶144 (*citing* ABA PROOF OF CONSPIRACY at 224–230.
[141] Singer Report ¶144 (*citing* Dijk and Verboven (2008) at 2331).

conduct is noncollusive, to estimate parameters, and then use these estimates to predict price movement during the conjectured cartel period."[142]

72. None of these sources advocate breaking up the Conduct Period into legally determined Class Periods, as it makes zero economic sense to do so. Tellingly, Dr. Haider cites no literature to support her assertion that the variable of interest should be a legally determined Class Period over the evidence-informed Conduct Period. Nor does she explain why my overcharge model, which demonstrated a 12.8 to 15.3 percent overcharge during the 2009-2018 Conduct Period, should not be applied to the 2014-2018 Class Period.[143]

73. Dr. Haider's modification of the Conduct variable without any *a priori* basis to do so is an attempt to undermine the model by identifying an artificial breakpoint in the data, which happens to coincide with the statute of limitations.[144] Arbitrarily testing structural breaks is bad econometric practice because such testing often "identifies" breaks in the data where none exists, which the literature recognizes is "hardly an example of sound scientific practice."[145]

74. That is the case here: Dr. Haider lacks any *a priori* evidence of a structural break in the Challenged Conduct starting at the beginning of the Class Period. She does not explain why the Conduct might have changed starting in 2014. A legally determined class start date chosen years after the period in question could not have had any impact on Defendants' actions in 2014. Choosing an artificial breakpoint for the soul purpose of finding statistically significant results to undermine a regression analysis is a cherry-picking exercise known as "p-hacking." The American Statistical Association (ASA) explicitly warns against practices that "emphasize the search for small p-values over other

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[142] Robert C. Marshall and Leslie M. Marx, THE ECONOMICS OF COLLUSION, CARTELS AND BIDDING RINGS [8] (The MIT Press 2012) at 218. Note that here the authors prefer two modified approaches to the one I employ, where 1) the factor input prices (such as corn) are either interacted with the conduct, or 2) to simply exclude conduct period data from estimating the right hand side parameters entirely. In either case, the relevant comparison is to the full Conduct Period, not an arbitrary Class Period.

[143] Singer Report ¶161.

[144] A structural break occurs when the coefficients of a regression equation change over time.

[145] Bruce Hansen, *The New Econometrics of Structural Change: Dating Breaks in U.S. Labor Productivity*, 15(4) JOURNAL OF ECONOMIC PERSPECTIVES 117-128, 118 (2001) [hereafter, Hansen (2001)] ("[A]n important limitation of the Chow test is that the break date must be known *a priori*. A researcher has only two choices: to pick an arbitrary candidate break date or to pick a break date based on some known feature of the data. In the first case, the Chow test may be uninformative, as the true break date can be missed. In the second case, the Chow test can be misleading, as the candidate break date is endogenous—it is correlated with the data—and the test is likely to indicate a break falsely when none in fact exists. Furthermore, since the results can be highly sensitive to these arbitrary choices, different researchers can easily reach quite distinct conclusions—hardly an example of sound scientific practice.") (Emphasis added). *See also* CHRISTOPHER BAUM, AN INTRODUCTION TO MODERN ECONOMETRICS USING STATA 183-184 (Stata Press 2006).

statistical and scientific reasoning."[146] Indeed, if Dr. Haider's methodology were to be adopted of testing breakpoints *without first theorizing why they would have economic significance*, an expert would be free to mine the data at will to identify breakpoints with little or no justification other than a "statistically significant" p-value. Such an approach lacks economic rigor and represents the exact sort of non-scientific approach the ASA warns against.

75. I defined the conduct period as 2009-2018 because Plaintiffs allege that a real economic change occurred in 2009: The Defendants and Co-conspirators began a price-fixing starting in 2009 and continuing until at least 2018.[147] 2009 marks the year that Agri Stats began offering "[redacted] reports targeted to pork processors,[148] and 2009 marks the year when Agri Stats [redacted][149] Thus, in addition to testing the Plaintiffs' theory of harm, which Dr. Haider cannot alter, there is an economically motivated reason for choosing 2009. Dr. Haider gives no economic motivation for starting the Conduct Period in 2014, nor does Dr. Haider explain what cartel behavior may have changed starting in 2014.

**b. *A Method of Showing the Incremental Effect of the Conduct Over Time Shows Economically and Statistically Significant Overcharge***

76. If Dr. Haider were truly interested in "measure[ing] the effects of the alleged conspiracy during the last four years of the alleged conduct period" as she claims, she could have "interacted" my Conduct variable with some standard dimension of time, such as a calendar year.[150] Such a method compares each calendar year of the Conduct (including the four years of the Class Period) against the benchmark period. Although it is my opinion (consistent with the literature cited above) that the correct way to measure overcharge is from a single conduct variable spanning the conducing period, if I "interact" the conduct by each calendar year, the regression shows positive and economically significant price overcharges in every year of the Class Period, and every year of the Conduct Period (except for 2009 in one of the two models).

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[146] *American Statistical Association Releases Statement on Statistical Significance and p-values,* AMERICAN STATISTICAL ASSOCIATION (March 7, 2016), *available at* https://www.amstat.org/asa/files/pdfs/P-ValueStatement.pdf.

[147] Singer Report ¶1.

[148] Singer Report ¶33.

[149] Singer Report ¶95, citing AGSTAT-P-0000019809, [redacted]

[150] Haider Report ¶108.

77. In Table 8 below, I present a version of the Defendant Sales Regression from my initial report that uses customer-specific fixed effects.[151] Rather than defining the "Conduct" variable to be a "1" between January 2009 to June 2018 and "0" otherwise, I create an interacted variable between the calendar year of the transaction and whether the Conduct was active during each transaction. (For example, "Conduct – 2018" is "1" for transaction between January and June 2018, and "0" between July and December.) This method allows me to compare the effect of the Conduct in each year compared to the benchmark period.[152] All of the other variables in this regression are unchanged. In the first column in Table 8, I include data post-2018 (including the "After Period" variable), and in the second column I omit this data (as I do as a robustness check in my initial report).[153]

78. The results show that the Conduct is associated with an overcharge in each year of the Class period. The first column, which includes post-Class Period data, shows that the Conduct-Year variable is both economically and statistically significant for each year of the Conduct Period except for 2009 (which predates the Class Period). Column two, which omits post-Class Period data, shows that the Conduct-year variable is both economically and statistically significant for each year in the Conduct Period. Both models show that the Conduct resulted in overcharges to Direct Purchases during the Class Period of 2014-2018, between 20 to 34 percent in the first model and 38 to 48 percent in the second model. These results by year are similar if the regression is run on a per-primal cut basis, similar to my product subgroup regressions in my initial report.[154] Although it is my opinion that my initial model which demonstrates a single overcharge over the entire conduct period is the most appropriate for the allegation of a single conspiracy, these results refute the results from Dr. Haider's proposed regression. But these results also demonstrate the fundamental flaw of attempting to show the incremental effects of the conspiracy over time: the results are higher than predicted by the single overcharge because the model is mechanically trying to square artificial structural breaks in the data where none exist.

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[151] Singer Report Table 12, column 4.

[152] WOOLDRIDGE at 236 ("The previous example illustrates a general principle for including dummy variables to indicate different groups: if the regression model is to have different intercepts for, say, *g* groups or categories, we need to include *g* - 1 dummy variables in the model along with an intercept. The intercept for the base group is the overall intercept in the model, and the dummy variable coefficient for a particular group represents the estimated difference in intercepts between that group and the base group.") *Id.* at 240, discussing interaction terms with dummy variables. *Id.* at 357 ("Binary or dummy independent variables are also quite useful in time series applications. Since the unit of observation is time, a dummy variable represents whether, in each time period, a certain event has occurred… Often, dummy variables are used to isolate certain periods that may be systematically different from other periods covered by a data set.").

[153] Singer Report ¶156, Appendix Table 2.

[154] Singer Report Table 23. *See* my workpapers for details.

TABLE 8: DEFENDANTS' SALES REGRESSIONS, INTERACTED CONDUCT BY YEAR

| | Dependent Variable: *ln(Wholesale Price Per Pound)* | |
|---|---|---|
| **Explanatory Variable** | **Inc. Post Class** | **Ex. Post Class** |
| ***Conduct — 2009*** | **-0.023** | **0.011** |
| ***Conduct — 2010*** | **0.166** | **0.22** |
| ***Conduct — 2011*** | **0.257** | **0.313** |
| ***Conduct — 2012*** | **0.211** | **0.285** |
| ***Conduct — 2013*** | **0.242** | **0.342** |
| ***Conduct — 2014*** | **0.335** | **0.441** |
| ***Conduct — 2015*** | **0.198** | **0.372** |
| ***Conduct — 2016*** | **0.22** | **0.422** |
| ***Conduct — 2017*** | **0.266** | **0.478** |
| ***Conduct — 2018*** | **0.249** | **0.478** |
| *Post Class Period* | 0.234 | -- |
| *ln(Total Cost Per 270lb Pig)* | 0.007 | 0.118 |
| *ln(Plant Cost Per Lb)* | 0.256 | 0.078 |
| *Piglet Loss Rate (6 Month)* | 0.002 | 0.009 |
| *Covid Flag* | 0.042 | -- |
| *Bacon Ingredient Index* | 0.004 | 0.004 |
| *Swine Flu Flag* | -0.043 | -0.049 |
| *ln(Beef-Chicken Index)* | 0.257 | 0.044 |
| *Pork Recalls Active* | -0.003 | -0.003 |
| *ln(Real GDP Per Capita)* | 0.055 | 0.051 |
| *Trend* | -0.862 | -1.262 |
| *Constant* | -1.063 | -0.696 |
| *All P-Values Below 0.01?* | Yes | Yes |
| *Cut-By-Month Seasonality?* | Yes | Yes |
| *Additional Fixed Effects:* | Processor - Product - Customer ID | Processor - Product - Customer ID |
| *Number of Additional FE:* | 215,593 | 184,712 |
| *Observations* | 3,885,498 | 3,193,106 |
| *R-Squared* | 93.1% | 93.3% |

*Notes:* The first bolded rows measure the effect of the Conduct; non-bolded rows are control variables. The p-values indicate the statistical significance of each coefficient estimate. *See* Wooldridge at 776-777.

### 2. Dr. Haider's Alternative Control Variables Make No Sense

79. Dr. Haider claims that I failed to account for "non-conspiratorial factors that affected pork prices during the relevant period."[155] Specifically, Dr. Haider claims I do not control for "trade," "national economic shocks," "the cost of acquiring live hogs," "the fact that 2008 was an anomalous year," and "the Circovirus vaccine" (which Dr. Haider claims

[155] Haider Report ¶114.

affected the market in 2008).[156] This is wrong: I show in Table 9 below that I explicitly control for the factors Dr. Haider is alleging in my regression analysis.

TABLE 9: DR. SINGER'S REGRESSION CONTROLS FOR ALL OF DR. HAIDER'S ALLEGED "NON-CONSPIRATORIAL FACTORS"

| **Dr. Singer's Regression Variables** | **Dr. Haider's Alleged "Non-Conspiratorial Factors"** |
|---|---|
| *Total Cost Per 270lb Pig* | "Cost of acquiring live hogs", "National Economic Shocks", "2008 anomalous year", "Circovirus vaccine" |
| *Plant Cost Per Lb* | "National Economic Shocks" "2008 anomalous year" |
| *Piglet Loss Rate (6 Month)* | "2008 anomalous year", "Circovirus vaccine" |
| *Bacon Ingredient Index (For Bacon Only)* | |
| *Swine Flu Flag* | |
| *Beef-Chicken Index* | "National Economic Shocks" |
| *Number of Pork Recalls Active* | |
| *Real GDP Per Capita* | "National Economic Shocks", "2008 anomalous year", "trade"* |
| *Trend* | "trade"* |
| *Cut-By-Month Seasonality* | |
| *Processor Fixed Effects* | |
| *Product Fixed Effects* | |
| *Customer Type Fixed Effects* | |
| *Customer ID Fixed Effects* | |

Note: *As I explain in Part II.A.4, Dr. Mintert's proposed "trade" variable is *98 percent correlated* with my Trend variable, and *85 percent correlated* with my Real GDP per Capita variable. Dr. Mintert proposes in Exhibit 22 that "international demand for U.S. pork" can be measured as the gross national income (GNI) of the top four importers of U.S. pork. Dr. Haider does not specify how to construct a "trade" demand variable.

80. None of Dr. Haider's nor Dr. Mintert's "factors" (discussed in Part III.B.1) are actually missing from my regression analysis. At best, Defendants' Experts' argument is that they might have controlled for those factors *differently*. Note that my measurement for the total cost of a hog specifically incorporates components such as feed, labor, and capital that would all be affected by the various "national economic shocks" or alleged "anomalies" in the year 2008.[157]

81. Dr. Haider does not dispute the inclusion of any of my control variables. Instead, Dr Haider offers two alternative regression control variables that she alleges

[156] Haider Report ¶114.

[157] Singer Report ¶153 ("I control for the cost of the pig itself. I use data compiled by Iowa State University that reports, on a monthly basis, the average cost of producing a 270-pound finished pig. These data account for the changing costs of animal feed (composed of ingredients such as the cost of corn and soybean meal), as well as nonfeed costs (variable and fixed) across time for a 'rank-and-file Iowa producer.'").

overturn my conclusions: A "cost of acquiring hogs" variable and a year 2008 dummy variable.[158] Neither of these variables belong in the regression, and Dr. Haider's "cost of acquiring hogs" variable is *actually* a dressed-up "hog price" variable, which renders her entire regression uninterpretable because it is endogenous. I discuss the problems with both of these variables below.

**a. *Dr. Haider's "Hog Acquisition" Variable Is Really "Hog Price" and Therefore Endogenous***

82. As I explained in my initial report, I control for the *cost* of the pig (hog) itself in my regression analysis.[159] This "Hog Cost" variable is itself a composite of multiple sub-costs that allows the regression to account for the changing costs of animal feed, variable costs (such as labor), fixed costs (such as equipment), and even changing interest rates for farmers.[160] Below is a snippet out of the "Hog Cost" dataset I use in my regression, showing the various "Feed costs" and "Nonfeed costs" for hog sales in January 2015 through March 2015. The variable used in my regression is the sum of the Feed and Nonfeed cost totals.

[158] Haider Report ¶114 ("For example, Class Experts do not consider the cost of acquiring hogs for any Defendant regardless of whether the Defendant almost always purchased hogs externally or the Defendant purchased a sizeable proportion of hogs externally. Further, Class Experts do not account for the fact that 2008 was an anomalous year with unprecedented events and developments in the pork industry.").

[159] Singer Report ¶153 ("I control for the cost of the pig itself. I use data compiled by Iowa State University that reports, on a monthly basis, the average cost of producing a 270-pound finished pig. These data account for the changing costs of animal feed (composed of ingredients such as the cost of corn and soybean meal), as well as nonfeed costs (variable and fixed) across time for a 'rank-and-file Iowa producer.'").

[160] *Estimated Returns – Swine, Farrow To Finish,* IOWA STATE UNIVERSITY, *available at* http://www2.econ.iastate.edu/estimated-returns/.

TABLE 10: COST DATA COMPOSING DR. SINGER'S "HOG COST" VARIABLE (JANUARY-MARCH 2015 EXAMPLE)

| **Estimated Returns to Farrow to Finish, Iowa $/head** | | | |
|---|---|---|---|
| Farrowing Month | Jun-14 | Jul-14 | Aug-14 |
| Sale Month | Jan-15 | Feb-15 | Mar-15 |
| **Costs of Producing 270 lb Finished Hog** | | | |
| Feed costs | | | |
| Corn, $/hd | 34.73 | 35.11 | 35.38 |
| Soybean meal, $/hd | 20.34 | 19.31 | 18.87 |
| Dried distiller grain, $/hd | 8.13 | 10.33 | 11.01 |
| Complete feeds and other ingredients, $/hd | 15.91 | 15.58 | 15.97 |
| Feed processing, $/hd | 4.14 | 4.14 | 4.48 |
| Total, $/hd | 83.25 | 84.48 | 85.71 |
| Nonfeed costs | | | |
| Variable costs, $/hd | 31.24 | 30.78 | 28.93 |
| Operating interest, $/hd | 2.45 | 2.45 | 2.43 |
| Fixed costs, $/hd | 17.60 | 16.79 | 16.82 |
| Total, $/hd | 51.29 | 50.02 | 48.18 |

Source: Singer Report Workpapers, "Farrow to Finish Excel_11-21.xlsx"

83. Moreover, an impressive number of factors make up the "Variable costs" line under "Nonfeed costs." According to the methodology document for this dataset, the "Variable costs" figures includes: Breeding and Genetic costs (including herd depreciation costs, semen costs, interest rates for herd investments, and insurance costs), farm labor costs, hog transportation costs, marketing costs, utilities, fuel and oil costs, veterinary costs, interest costs, and other "miscellaneous costs" for raising a hog.[161] To my knowledge, this is the most comprehensive dataset for measuring the costs of producing a U.S. in existence. Dr. Haider does not dispute the integrity of this dataset.

84. Instead, Dr. Haider proposes an alternative "cost of acquiring hogs" variable. Dr. Haider claims that this variable "accounts" for the fact that some Defendants purchased all or some of their hogs—as opposed to raising their own hogs via vertical integration.[162] When she replaces my "hog cost" variable with her "cost of acquiring hogs" variable, her regression results allegedly show lower (but not zero) overcharge.[163]

[161] The data and methods used to construct the index are as described in Lee L. Schultz, *Procedure for Estimating Returns Farrow to Finish*, Iowa State University (2014), *available at* http://www2.econ.iastate.edu/estimated-returns/Farrow%20to%20Finish%20Procedure.pdf.

[162] Haider Report ¶¶115-116.

[163] Haider Report Exhibit 19, Exhibit 22. Both of these exhibits show positive and statistically significant overcharge from the Conduct variable.

85. This variable is irremediably flawed in both its conception and its execution. To start, Dr. Haider's logical motivation is uneconomic. Dr. Haider writes that:[164]

> By accounting for the cost of raising hogs (and not the cost of purchasing hogs), Class Experts overlook that some Defendants purchased almost the entirety of hogs that they processed, and even for Defendants that raised some hogs, they too purchased hogs they processed. For example, as I describe above, some Defendants, including Hormel, JBS, and Tyson, owned very few hogs and purchased almost all hogs externally during the alleged conduct period.

Dr. Haider is wrong. No adjustment to hog cost by Defendant is necessary. As I explain above in Part II.2.b, absent special synergies from integration, a pork processor's vertical integration into hogs does not allow it to produce inputs cheaper than an independent hog farmer.[165] Consider: Smithfield and an independent hog farmer can both produce a hog for $100 in costs, and hogs trade at $105 in the marketplace. Dr. Haider would have us believe that Smithfield "saves" $5 when producing a hog internally for $100, relative to Hormel who purchases a hog for $105 in the marketplace.[166] But this logic ignores the *opportunity cost* for Smithfield's farming division: Smithfield's farming division forgoes $5 in profit ($105 - $100) every time they transfer a hog internally instead of selling it for $105 on the open market. Thus, for both Pork processors, we must use the same cost basis or else inappropriately credit profits to firms where none exist. By calculating "cost of hog acquisition" on a per-Defendant basis, Dr. Haider ignores economic reality.

86. Critically: Dr. Haider's "cost of acquiring hogs" variable is really *a national average hog prices.*[167] Dr. Haider misrepresents that her "cost of acquiring hogs" variable is published by the USDA.[168] The USDA does not report "acquisition" costs, it reports hog

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[164] Haider Report ¶116.

[165] While the vertically integrated firm would "save" on *accounting profits* from producing internally, it its *economic profits* (which account for the opportunity cost of capital) are unchanged. *See* MANKIW at 250–251.

[166] Dr. Haider's Workpapers include calculations that decompose the use of hog prices based on the percentage hogs owned by each Defendant.

[167] She alternatively terms this variable "USDA Cost of Hog Acquisition." This is misleading because the USDA does not report any "Cost of Hog Acquisition" variables. They report hog prices. *See* Haider Exhibit 19, Exhibit 22, Haider Report ¶117 ("Meanwhile, Exhibit 16 shows that Hormel's actual hog procurement cost per CWT (i.e., cost per hundred pounds) shown in orange closely tracks the *hog acquisition cost per CWT published by USDA* shown in green.") (emphasis mine).

[168] Dr. Haider does not report the source of this USDA data in her report or in her workpapers. Based on the values of "Hogs, Price Revied - $/CWT" reported in her workpapers, I believe this data comes from the USDA's National Agricultural Statistics Service Information data series on

*prices.* Indeed, Dr. Haider's workpapers reveal that the "cost of acquiring hogs" variable is simply a modified version of the USDA's reported monthly average U.S. average hog *prices*, measured in dollars per hundredweight. In other words, while my "cost" variable measures how the inputs that go into raising a hog change across time, Dr. Haider's variable "acquisition" or "price" variable looks at the *market prices* of hogs across time.

87. There is a critical difference between my use of hog *costs* and Dr. Haider's use of hog *prices*. My measurement of hog cost is comprised of various subcomponents such as feed, labor, and capital. These prices of these cost subcomponents move *independently* from the price of Pork because they are determined by economic factors largely unrelated to consumer demand for Pork. Put differently: The cost of raising a hog changes for reasons unrelated to consumer Pork demand.

88. In contrast, the *price* of a hog is determined by both the supply for hogs (which I measure) and the demand for hogs (which Dr. Haider adds).[169] This is problematic because the *demand for hogs is approximately the same as the demand for Pork.* Hogs only have a single economic use—to be turned into pork.[170] All else equal, higher Pork prices lead to higher hog prices. The data confirm this: USDA Pork wholesale prices are very strongly correlated with hog prices during the Conduct Period.[171] Put differently: The price of a hog is *very highly correlated* with consumer Pork demand.

89. By using hog *prices* instead of my hog *costs* variable, Dr. Haider is circularly attempting to explain the price of Pork using a variable that is, itself, determined by the price of Pork. In economic terms, what this means is that Dr. Haider's price of hogs variable ("cost of acquiring hogs") is endogenous.[172] In particular, because the price of Pork and the price of Hogs are jointly determined by consumer Pork demand, Dr Haider's regressions suffer from a form of endogeneity termed "simultaneity bias". This occurs when a regression's dependent variable (Pork price) is simultaneously determined with an independent variable (hog price) by some outside factor (consumer demand).[173] When a regression suffers from simultaneity bias, the coefficients on both the endogenous variables

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commodity products. *See Hogs - Price Received, Measured in $/CWT*, USDA, NASS (accessed Nov. 7, 2022), *available at* https://quickstats.nass.usda.gov/#A07B0B51-19DB-30DE-8C4A-55AA5663F079.

[169] *See, e.g.,* MANKIW at 66 ("[S]upply and demand determine prices in a market economy[.]").

[170] *See, e.g.,* Mintert Report ¶20 ("essentially all hogs end up sold and slaughtered").

[171] Dr. Haider's "Hog Acquisition Cost" variable and USDA pork prices are 85 percent correlated during the Conduct Period. By contrast, my Hog Cost variable is only 37 percent correlated with pork prices during the Conduct Period.

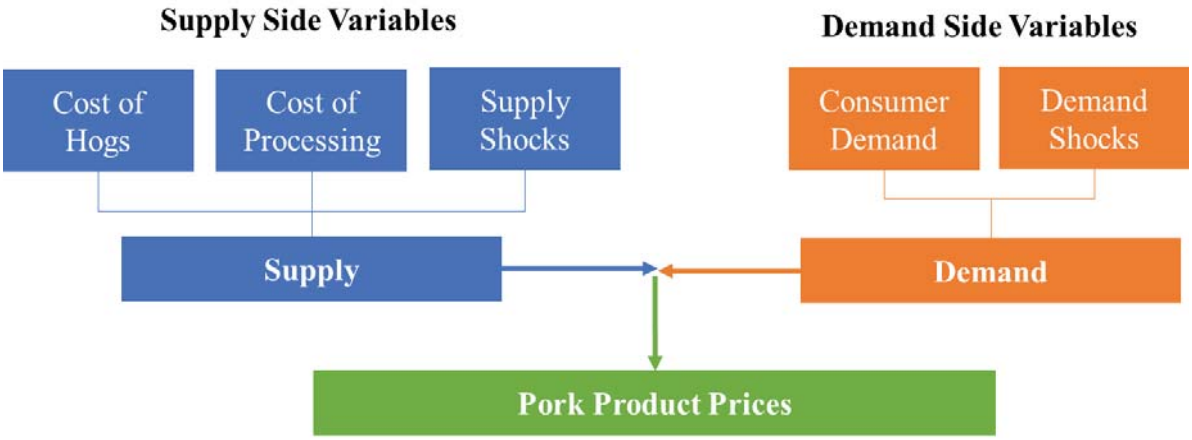
[172] Wooldridge at 87.

[173] Wooldridge at 554 ("Another important form of endogeneity of explanatory variables is simultaneity. This arises when one or more of the explanatory variables is jointly determined with the dependent variable").

in the model and the exogenous control variables are biased and inconsistent.[174] Regressions that suffer from simultaneity bias, like Dr. Haider's here, are unreliable.

90. I show this problem visually below. Figure 4 shows a broad overview of my overcharge regression model. My model attempts to explain the dependent variable, Pork prices, as a function of Pork's supply and demand factors. On the demand side, I include long run consumer demand factors such real GDP per capita as well as demand "shocks" such as Swine Flu or COVID-19. On the supply side, I include the cost of the hogs, the cost of running the processing plant, and supply "shocks" such changing piglet mortality.

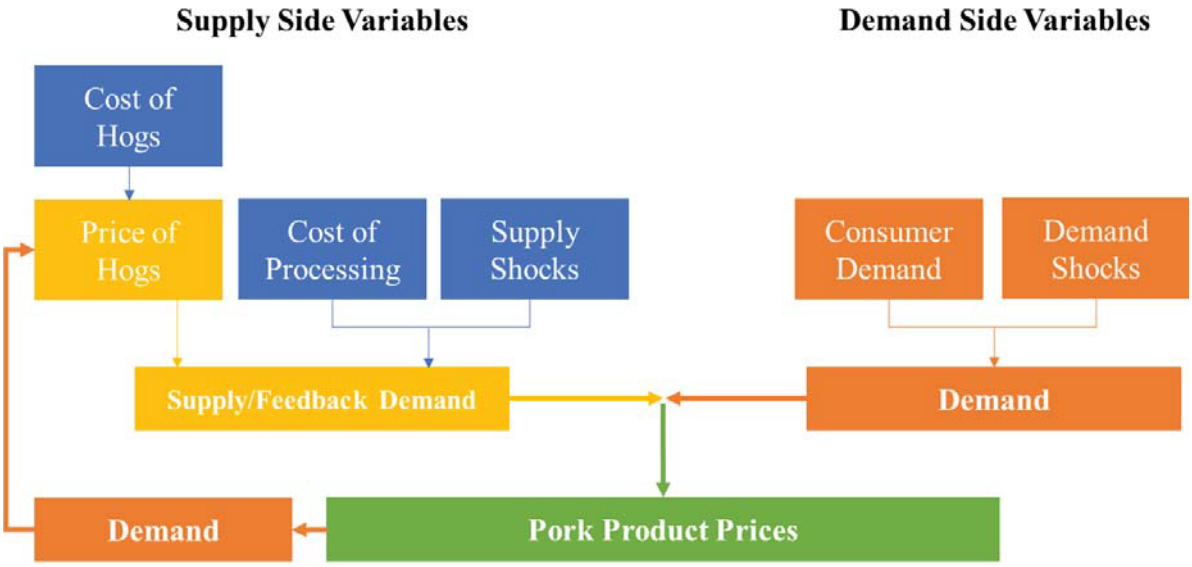
FIGURE 4: DR. SINGER'S COST OF HOGS MODEL




91. Dr. Haider's "cost of acquiring hogs" model is shown in Figure 5 below. Dr. Haider replaces my "Cost of Hogs" variable with her "Price of Hogs" ("cost of acquiring hogs") variable. The "Price of Hogs" variable is itself determined, in large part, by the price of Pork products. In reality: both of these variables are simultaneously determined by consumer demand for Pork. That demand is *transmitted upstream* to hog demand in the form of higher Pork prices. So, in Dr. Haider's model, the "Price of Hogs" variable informs demand, which informs Pork prices, which then re-informs the "Price of Hogs" variable. This circularity creates a feedback loop which renders her regression unreliable.

[174] Wooldridge at 558 ("16.2 Simultaneity Bias in OLS […] It is useful to see, in a simple model, that an explanatory variable that is determined simultaneously with the dependent variable is generally correlated with the error term, which leads to bias and inconsistency in OLS.)."

FIGURE 5: DR. HAIDER'S PRICE OF HOGS MODEL




**b. *Dr. Haider's Year 2008 Dummy Variables Defy Basic Econometric Rigor***

92. Dr. Haider claims that the calendar year 2008 was "unusual" due to "economic downturn and several industry events[.]"[175] Dr. Haider points out that in my initial report, I created a three month "dummy" variable for the onset of COVID-19—a variable equal to "1" for April, May, and June 2020 and "0" otherwise—to account for the unanticipated shock to the U.S. economy.[176] According to Dr. Haider, the calendar year 2008 was also so "unusual" that *it too* deserves its own "dummy" variable—equal to "1" for the calendar year of 2008 and "0" otherwise.[177] In other words, because I used a three month dummy variable for the onset of COVID-19, Dr. Haider believes she is justified using a twelve-month dummy variable for the calendar year 2008. When she includes a calendar year 2008 dummy in the regression, she claims the nonsensical results the regression produces is evidence of my model's reliability.[178] Dr. Haider then makes the

[175] Haider Report ¶126.
[176] Haider Report ¶126. Singer Report ¶156.
[177] Haider Report ¶128.
[178] Dr. Haider even makes the brazen claim that a 2008 dummy is "direct evidence that Class Experts' approach suffers from omitted variable bias." Haider Report ¶128.

*bizarre* decision to include 2008 in the alleged conduct period based on a misrepresentation of my deposition testimony.[179] Neither of these modeling decisions are remotely valid.

93. To start, my model *already exactly controls* for the three "unusual industry events" that Dr. Haider alleges. Dr. Haider claims that 2008 was unusual because of (1) "the severe economic downturn," (2) a "change in hog supply in 2008 [a]s a result of the Circovirus vaccine, which [decreased] hog mortality levels," and (3) a weakly asserted "increasing productivity in hog farming." Table 11 below shows I already control for these in my initial overcharge model. The 2008 economic downturn is explicitly captured by four variables: Real Changes in GDP Per Capita, Plant Cost, Hog Cost (Total Cost Per 270lb Pig), and the relative prices of chicken and beef (Beef-Chicken Index). Dr. Haider's alleged change in hog supply due to Circovirus is explicitly controlled for by my Piglet Loss Rate (piglet mortality) variable, as well as my Hog Cost variable. Dr. Haider's weakly asserted "increasing productivity" would be captured in my trend variable. Dr. Haider has not listed any event that my regression model does not already account for.

TABLE 11: MY REGRESSION MODEL ALREADY CONTROLS FOR DR. HAIDER'S ALLEGED 2008 "UNUSUAL" FACTORS

| **Dr. Haider's Alleged 2008 "Unusual Year" Factors** | **Dr. Singer's Regression Variables** |
|---|---|
| "Severe economic downturn" | *Real GDP Per Capita; Plant Cost Per Lb; Total Cost Per 270lb Pig; Beef-Chicken Index* |
| "Change in hog supply due to Circovirus vaccine" | *Piglet Loss Rate (6 Month); Total Cost Per 270lb Pig* |
| "increasing productivity in hog farmers" | *Trend* |

94. Even if my regression model *did* miss some alleged omitted variable that was "unusual" in 2008, the econometrically correct way to proceed is to *identify* the alleged omitted variable and include it in the regression.[180] Dr. Haider does not bother to do this. Instead, she arbitrarily assigns every single Defendant sale from January 1, 2008, through December 31, 2008 its own special variable, despite the fact that these calendar year dates bear no relation to the economic phenomenon Dr. Haider asserts were "unusual" in 2008. Including an indicator variable for 2008, as Dr. Haider did, is an extremely crude tool for

[179] Haider Report ¶132 ("when I estimate Class Experts' overcharge regressions and treat 2008 as part of the alleged conduct period, I find Class Experts' conclusions are overturned.").

[180] I described the "omitted variable" problem in Part II.a.4, *supra*. If data for the omitted variable is unavailable, a proxy variable can be used. *See* Wooldridge at 309 ("How can we solve, or at least mitigate, the omitted variables bias in an equation like(9.9)? One possibility is to obtain a proxy variable for the omitted variable. Loosely speaking, a proxy variable is something that is related to the unobserved variable that we would like to control for in our analysis. In the wage equation, one possibility is to use the intelligence quotient, or IQ, as a proxy for ability. This does not require IQ to be the same thing as ability; what we need is for IQ to be correlated with ability, something we clarify in the following discussion.").

controlling for these events because it introduces a new structural break in the data for phenomenon that did not end and begin on the calendar year. As I explain in Part II.b.1, introducing structural breaks without grounded *a-priori* reasons is an invalid econometric practice.

95. What Dr. Haider is actually doing is tampering with over 30 percent of the "benchmark" pre-Conduct data. In the Defendant regression dataset, the year 2008 accounts for 31 percent of 2004–2008 data by observation count. By giving the calendar year 2008 its own dummy variable, Dr. Haider removes the ability of data for that year to act as a clean benchmark.

96. Finally, there is zero economic reason to "recode" the Conduct Period to begin in 2008 instead of 2009. As I explain above in Part II.B.1, Dr. Haider's attempts to redefine the Conduct Period are invalid. Plaintiffs' theory is that the Challenged Conduct began in 2009, which is supported by documentary evidence that January 2009 was the beginning of the Challenged Conduct.[181] Dr. Haider has no *a priori* grounds to change this to January 2008.[182]

### 3. Dr. Haider's Own "Direct Purchasers" Regression Shows Widespread Overcharge and Impact

97. In Part VI.D of her report, Dr. Haider alleges that my regression "cannot establish that all or nearly all Direct Purchasers sustained an overcharge" because my regression does "not allow for the possibility that some Direct Purchasers may have been able to avoid an overcharge."[183] To remedy this alleged deficiency, Dr. Haider allows both my defined Conduct variable and my defined After Period variable to vary by Direct Purchaser. Limiting the data to those direct purchases who had at least 50 observations before, during, and after the Conduct period,[184] Dr. Haider finds that "some top Direct Purchasers sustained no positive and statistically significant overcharges."[185]

98. How many is "*some*"*?* Dr. Haider relegates this table to the Appendix, and for good reason. Dr. Haider's own analysis shows that *96.2 percent* of the direct purchasers in her own analysis yielded positive and statistically significant overcharges from the Conduct (601 out of 625 Direct Purchasers estimated). I show in Table 12 below that when

[181] *See* Part II.B.1.a, *supra.*
[182] Dr. Haider's report cites to my deposition as evidence that I consider 2008 as an "edge year." This does not mean 2008 should be included as a Conduct Period year. Haider Report ¶132, *citing* Singer Dep. 70:15-21.
[183] Haider Report ¶141.
[184] *See* Haider Report ¶144, n. 263. (Her footnote does not convey the After Period observation restriction).
[185] Haider Report ¶145.

Dr. Haider's table is expressed in terms of dollar sales of Pork Products, *99.2 percent* of all Pork transactions analyzed show positive and statistically significant overcharge.

TABLE 12: DR. HAIDER'S EXHIBIT D-13 WITH NET PURCHASER PURCHASES

| | Alleged Conduct Period January 2009 - June 2018 | Alleged Conduct Period January 2009 - June 2018 |
|---|---|---|
| | Count of Direct Purchasers | Percentage of Direct Purchasers' Net Spending |
| | [a] | [b] |
| **Positive and Statistically Significant[2]** | **601** | **99.23%** |
| Positive and Not Statistically Significant | 10 | 0.31% |
| Negative and Statistically Significant | 3 | 0.03% |
| Negative and Not Statistically Significant | 11 | 0.43% |
| **Total Number of Top Direct Purchasers with No Positive Statistically Significant Overcharge** | 24 | 0.77% |
| Not Estimated[3] | 10 | |
| **Top Estimated Direct Purchasers** | **625** | **100%** |

*Notes:*
1. Top Direct Purchasers are those with at least 50 observations in the proposed class period and 50 observations in the benchmark period.
2. Statistical significance is reported at the 5% significance level.
3. This is when a coefficient is not estimated for the alleged conduct period, the proposed class period, the early conduct period or the post-class period.

*Source*: Dr. Haider's Exhibit D-13.

99. Furthermore, if I remove Dr. Haider's arbitrary restriction that the After Period must vary by Direct Purchaser, these figures rise to 98.7 percent impact by count and 99.96 percent impact by net sales. In other words, Dr. Haider's own regression analysis demonstrates how the overcharge was felt by virtually every Direct Purchaser.

TABLE 13: DR. HAIDER'S EXHIBIT D-13 WITH NET PURCHASER SPENDING—NO AFTER PERIOD VARIATION

| | Alleged Conduct Period January 2009 - June 2018 | Alleged Conduct Period January 2009 - June 2018 |
|---|---|---|
| | Count of Direct Purchasers | Percentage of Direct Purchasers' Net Spending |
| | [a] | [b] |
| **Positive and Statistically Significant[2]** | **626** | **99.96%** |
| Positive and Not Statistically Significant | 5 | 0.03% |
| Negative and Statistically Significant | 1 | 0.00% |
| Negative and Not Statistically Significant | 2 | 0.01% |
| **Total Number of Top Direct Purchasers with No Positive Statistically Significant Overcharge** | 8 | 0.04% |
| Not Estimated[3] | 1 | |
| **Top Estimated Direct Purchasers** | **634** | **100%** |

*Notes*:
1. Top Direct Purchasers are those with at least 50 observations in the proposed class period and 50 observations in the benchmark period.
2. Statistical significance is reported at the 5% significance level.
3. This is when a coefficient is not estimated for the alleged conduct period, the proposed class period, the early conduct period or the post-class period.

*Source*: Dr. Haider's Exhibit D-13.

100. As explained above, my initial analysis used a single Conduct and an in-sample prediction method to demonstrate over 99 percent impact. This is the proper construction of the regression model. There is no *a priori* reason to believe that some Direct Purchasers could evade a price overcharge. To the extent that some Direct Purchasers leveraged a modicum of countervailing bargaining power, I control for this using purchaser specific fixed effects. Dr. Haider's analysis here only adds to the body of evidence that virtually all Direct Purchasers were impacted by the alleged Conduct.

101. Dr. Haider claims in a footnote that her approach of allowing the Conduct variable to vary by Direct Purchaser is justified through the use of a statistical test called an "F-test" or "Chow test".[186] A Chow test assess whether all of the coefficients on all of the independent variables in one time period are identical to all of the coefficients on all of the independent variables in another time period. But the econometric textbooks make clear Chow tests should only be performed to check on *known structural break* point in the

[186] Haider Report ¶144.

data.[187] They are not to be used repeatedly across every Direct Purchaser to determine if any point can be considered a structural break, as Dr. Haider did. Even ignoring Dr. Haider's unorthodox application of the Chow Test, a Chow Test would not change the fact that the econometric framework I employ here, which does not model arbitrary structural breaks, is recognized among the "dominant approaches to estimation of benchmark damages in antitrust litigation."[188]

102. Dr. Haider also claims that the "average overcharge" method I employ "has been widely criticized in the economics literature related to antitrust class actions."[189] Dr. Haider cites three sources in support of this "widely criticized" theory—one of which is *me*. None of these criticize the use of an average overcharge. As I explained in Part II.B.1.a, the literature supports the use of a single Conduct variable.

103. Dr. Haider first cites her own article in the ABA section of Antitrust Law.[190] Nothing in her quotation "criticizes" the use of a single conduct coefficient. Her quotation is with respect to testing if the average effect varied between customers. In my report, I do this with an In-Sample prediction test. Dr. Haider here uses a by-Defendant conduct interaction. *Both methods show over 99 percent impact on net sales.*

104. Dr. Haider's second citation is to Bret Dickey and Daniel Rubinfeld. As explained in Part II.B.1.a, Dr. Rubinfeld has unambiguously written that the use of a single conduct coefficient is the standard in antitrust analysis. Dickey and Rubinfeld's quotation here is not a "criticism" of using an average overcharge. Dr. Haider also omits this critical line from the piece: "Defendants should be expected to explain why the variation in the

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[187] Bruce Hansen, *The New Econometrics of Structural Change: Dating Breaks in U.S. Labor Productivity*, 15(4) JOURNAL OF ECONOMIC PERSPECTIVES 117-128, 118 (2001). *See also* G.S. MADDALA & IN-MOO KIM, UNIT ROOTS, COINTEGRATION, AND STRUCTURAL CHANGE 391-392 (4th ed. Cambridge University Press 2002) ("The traditional Chow (1960) test is developed to test the null hypothesis of parameter constancy against the alternative of a *known break point* a priori under the assumption of constant variances.") (emphasis added). Also, in the *Handbook of Antitrust Economics*, Professor Harrington notes that "The classical Chow test is a useful test for structural change *if there is prior information* as to when a cartel could have formed (or could have collapsed)." *See* Joseph E. Harrington, Jr., *Detecting Cartels* in HANDBOOK OF ANTITRUST ECONOMICS ed. Paulo Buccirossi (The MIT Press, 2008), at 220. *See also* Logan Kelly and David Sienko, *Before-and-after analysis: An application of structural break testing to the determination of economic damages*, presented at the American Economic Association, January 6, 2018 at 8. ("…the validity [of] the Chow test *is dependent on knowing, a priori, the date of the structural change*") (emphasis added).

[188] Justin McCrary & Daniel Rubinfeld, *Measuring Benchmark Damages in Antitrust Litigation* 3(1) JOURNAL OF ECONOMETRIC METHODS 63-74 (2014), at 63; 68-69.

[189] Haider Report ¶143.

[190] ABA Section of Antitrust Law. Econometrics: Legal, Practical, and Technical Issues. ABA Book Publishing, Second Edition, 2014, p. 357.

demand and supply variables is likely to lead to variation in per-unit damages."[191] Dr. Haider does not explain what economic theory leads Direct Purchasers to evade damages. As noted by Dickey and Rubinfeld, "volume discounts" or "individual negotiations" are not a sufficient reason if these were present both before and during the alleged conspiracy.[192]

105. Finally, Dr. Haider's third citation is to Dr. Kevin Caves and myself. As explained in Part I.A above, I do not "criticize" the use of a single Conduct coefficient. My approach in this case is consistent with my previous writings on the topic.

**4. Dr. Haider's Claims About In-Sample Prediction Do Not Refute Widespread Direct Purchaser Impact**

106. In my initial report, I demonstrate that the price overcharge from the Challenged conduct can be shown to have impacted all or nearly all indirect Pork purchasers during the class Period.[193] The first part of this proof was to demonstrate that all Direct Purchasers paid inflated Pork prices. The second part was to demonstrate that these inflated Pork prices were passed on to Indirect Purchasers.

107. I demonstrated the first part of the proof for showing widespread impact to Direct Purchasers using *three* independent methods:

- An in-sample prediction method using the results from the regression overcharge model.[194] This standard method showed that 99.8 percent of all Direct Purchasers overpaid on a Pork product purchase at least once, which represented over 99.99 percent of all Pork commerce.[195]

- A pricing structure regressions. This analysis showed that Pork prices paid by Direct Purchasers were tightly linked ($0.81 and $0.77 cents to the dollar),

[191] Bret M. Dickey and Daniel L. Rubinfeld, *Antitrust Class Certification: Towards an Economic Framework*. 66 NYU ANNUAL SURVEY AMERICAN LAW 461-467, at 467 (2011).

[192] *Id.* at 467 ("Simply put, if the plaintiffs propose a pricing model such as the model given by Equation (2), defendants might argue that each purchase by an individual plaintiff occurs at a different price due, for example, to the presence of volume discounts or individual contract negotiations. If this is the case, Equation (1) rather than Equation (2) is appropriate, which argues against class certification. Plaintiffs might respond that the individual pricing associated with these differences arose both before and during the alleged conspiracy, and that the per-unit damage is the same for all individuals. In that special case, an analysis of average prices as given in Equation (2) can be used to evaluate injury and damages issues.").

[193] Singer Report Part V.

[194] Singer Report V.A, V.B.

[195] Singer Report Part V.A, Table 16.

meaning any overcharge to a product or product category would have been broadly felt by Direct Purchasers across Defendants.[196]

- Separate overcharge regressions which show that Pork prices were artificially inflated for:
    - All five of the major Pork product categories.[197]
    - For each of the seven Defendants.[198]
    - For all types of Direct Purchasers in the data.[199]

108. Dr. Haider's report helpfully offers a *fourth* method of demonstrating that virtually all Direct Purchasers paid inflated Pork prices, similar to my third method above for Direct Purchasers. As I explain above in Part II.3, Dr. Haider's own, unaltered analysis demonstrates that that *96.2 percent* of the Direct Purchasers in her "Direct Purchaser" regression yielded positive and statistically significant overcharges from the Conduct.[200] When expressed in terms of dollar sales of Pork Products, Dr. Haider's analysis shows *99.2 percent* of all Pork transactions analyzed show positive and statistically significant overcharge. This further demonstrates that virtually all Direct Purchasers were impacted by the Challenged Conduct.

109. Dr. Haider is silent on my third method which performs separate overcharges by each Pork category, Defendant, and Direct Purchaser. Coupled with her own analysis of Direct Purchasers, our two analyses demonstrate common impact.

110. Nevertheless, Dr. Haider makes various claims about my first two methods, the in-sample prediction method and my pricing structure analysis. I respond to these claims below, and show that Dr. Haider's variation of my pricing structure regression *still* shows evidence of a common pricing structure for Pork. That is to say—even if Dr. Haider is correct on all counts, her own variant analyses still demonstrate widespread impact of a price overcharge.

### a. *The In-Sample Prediction Method Is Supported by My Citations and Has Been Used Successfully in Class Action Antitrust Cases*

111. My in-sample prediction showed that over 99 percent of direct purchasers paid a real-world Pork price higher than the but-for price absent the Challenged Conduct at least once. I describe this method in detail in my report, where I outline the logic of the

[196] Singer Report Part V.B, Table 17.
[197] Singer Report Part IV.A, Table 23.
[198] Singer Report Part IV.B, Table 24.
[199] Singer Report Part IV.C, Table 24.
[200] *See* Table 12, *supra*.

in-sample prediction method from the Federal Judicial Center's *Reference Manual on Multiple Regression.*[201] I also cite three recent antitrust cases where Plaintiff's economists' have used this same in-sample prediction to demonstrate Common Impact.[202]

112. Despite my sources, Dr. Haider claims without citation to any authority that this approach is not standard in econometrics.[203] She claims she has not seen this approach in any econometrics journal or textbook—although at deposition, Dr. Haider did admit she had seen this method in the context of class action cases.[204] More seriously, Dr. Haider claims that my quotation of the *Reference Manual* is "misleading." I want to address this last claim directly because Dr. Haider's accusation is a serious one, and it is demonstrably wrong.

113. Dr. Haider states that I "make the misleading claim that the Reference Manual on Scientific Evidence validates [my in sample-prediction] approach."[205] In the footnote to that sentence, she elaborates that "[t]he particular case is cited in the Reference Manual in support of 'accounting for other explanatory variables of interest' in a regression analysis. Crucially, Dr. Singer's application is distinct from that described in the wage discrimination case."[206] Dr. Haider does not elaborate on how my application is "distinct" from the text in the *Reference Manual*. At deposition, Dr. Haider was asked to elaborate on *how* my method was distinct from the approach stated in the *Reference Manual*, Dr. Haider replied that my in-sample prediction approach was "very different" from the reference manual because:[207]

> "[T]he analysis [that's] being cited is this labor and employment case [… and that] model is not estimated with females in. It's only estimated on males, and a prediction is made about females […] That's [] what is commonly known as this **forecast approach**, that is distinct from what Dr. Singer and the class experts are doing here. [T]hats not what they're doing, because they're not – they're not taking data just from

[201] Singer Report ¶¶169-170. *See also id.* at n. 337, *citing Reference Manual* at305, 335.

[202] Singer Report ¶196 n. 336, citing *In re Air Cargo Shipping Servs. Antitrust Litig.*, No. 06-MD-1775 JG VVP, 2014 WL 7882100 (E.D.N.Y. Oct. 15, 2014). *See also In re Capacitors Antitrust Litigation (No. III)*, case No. 17-md-02801-JD, 2018 WL 5980139 (N.D. Cal. Nov. 14, 2018); *In re Packaged Seafood Prods. Antitrust Litig.*, 332 F.R.D. 308 (S.D. Cal. 2019).

[203] Haider Report ¶152.

[204] Haider Deposition 257:19-23 ("The only place I've seen this method, and I've seen this method being described as actually testing something and being able to tell you something, is in the context of these class action cases.").

[205] Haider Report ¶152.

[206] *Id.* n. 291.

[207] Haider Dep. 252:12-253:19.

> the benchmark period[….] Instead, [] they have both periods in the model.

This is a heroic example of misdirection. Dr. Haider's distinction here make no difference whatsoever.

114. Assume for the moment that Dr. Haider is correct, and that the Plaintiff's expert in the example case cited in the *Reference Manual* used a "forecast approach" instead of including all the data in the model, as I do in this case. Even if that were true, the *Reference Manual never mentions it.* Why? Because the *Reference Manual* uses this case to motivate *the general use of regression analysis*, which is then described in the chapter. After quoting the court from this case, the *Reference Manual* states that "[t]the first step in **such a regression analysis**" is to identify the key independent variables. The *Reference Manual* never mentions whether the Plaintiff's expert in this motivating case used a "forecast approach." It is not important, because it is not relevant for the content of the chapter. Presumably, Dr. Haider read this chapter, found nothing in the *Reference Manual* that contradicted what I wrote, and then dove into the Plaintiffs' expert report from the example case as a last-ditch effort to draw *any* distinction from what I did and what the *Reference Manual* states.

115. The *Reference Manual's* authors clearly did *not* have a "forecast approach" in mind, since the *Reference Manual's* later example of a wage discrimination regression *specifically* uses a model that includes all of the data (both men and women in this case) in the same model, as I do in this case.[208] Even if, counterfactually, the text of the *Reference Manual* did describe the in-sample prediction in the context of a "forecast approach" regression analysis, it would not make a difference. There is no reason a "forecast approach" would preclude using the same in-sample prediction method as a regression model that used all of the data.

116. At the risk of bludgeoning the reader with econometric text, below I reproduce the relevant body text and footnote material of the *Reference Manual* I cite in my description of the in-sample prediction method. This passage explicitly supports what I am doing, *especially in the explicit case of a cartel case using a conduct period variable.* The text makes zero mention of Dr. Haider's nitpick of "forecast" modeling.[209] My hope is that this dispels Dr. Haider's egregious charge that I am "misleading" the reader.

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[208] *Reference Manual* at 350 ("To show that this [sex discrimination] difference was statistically significant, the expert put forward a regression of salary (SALARY) on a constant term and a dummy indicator variable (FEM) equal to 1 for each female and 0 for each male.").

[209] *Reference Manual* at 305-306.

**Reference Guide on Multiple Regression**

**I. Introduction and Overview**

[…] Multiple regression analysis is sometimes well suited to the analysis of data about competing theories for which there are several possible explanations for the relationships among a number of explanatory variables. Multiple regression typically uses a single dependent variable and several explanatory variables to assess the statistical data pertinent to these theories. **In a case alleging sex discrimination in salaries, for example, a multiple regression analysis would examine not only sex, but also other explanatory variables of interest, such as education and experience.[4]** The employer-defendant might use multiple regression to argue that salary is a function of the employee's education and experience, and the employee-plaintiff might argue that salary is also a function of the individual's sex. **Alternatively, in an antitrust cartel damages case, the plaintiff's expert might utilize multiple regression to evaluate the extent to which the price of a product increased during the period in which the cartel was effective, after accounting for costs and other variables unrelated to the cartel.** […]

More generally, multiple regression may be useful (1) in determining whether a particular effect is present; (2) in measuring the magnitude of a particular effect; and **(3) in forecasting what a particular effect would be, but for an intervening event.**

[Footnote 4]

Thus, in Ottaviani v. State University of New York, 875 F.2d 365, 367 (2d Cir. 1989) (citations omitted), cert. denied, 493 U.S. 1021 (1990), the court stated:

In disparate treatment cases involving claims of gender discrimination, plaintiffs typically use multiple regression analysis to isolate the influence of gender on employment decisions relating to a particular job or job benefit, such as salary.

The first step in such a regression analysis is to specify all of the possible "legitimate" (i.e., nondiscriminatory) factors that are likely to significantly affect the dependent variable and which could account for disparities in the treatment of male and female employees. **By identifying those legitimate criteria that affect the decision making process, individual plaintiffs can make predictions about what job or job benefits similarly situated employees should ideally receive, and then can measure the difference between the predicted treatment and the actual treatment of those employees. If there is a disparity between the predicted and actual outcomes for female employees, plaintiffs in a disparate treatment case can argue that the net "residual" difference represents the unlawful effect of discriminatory animus on the allocation of jobs or job benefits.**

### b. *Dr. Haider's Fails to Understand the In-Sample Prediction Method and Mischaracterizes It*

117. Dr. Haider's criticisms of the in-sample prediction method are premised on rejecting half of the method outright. Dr. Haider partially re-runs my in-sample prediction method and reports that 85 percent of *transaction*s in Defendants' sales data (representing 87 percent of sales revenue) experienced an overcharge during the Class Period, which she (incorrectly) claims imply that "there are no overcharges to pass through to end purchasers

in 15% of transactions."[210] Dr. Haider then goes on to claim that the in-sample prediction model would "flag" over half of all sales transactions in the *benchmark period* (as opposed to the Class or Conduct Period) as having overcharges where none exist.[211] This analysis is nonsensical. Dr. Haider is flouting the methodology laid out by the *Reference Manual*, and her "illustration" is meaningless.

118. The in-sample prediction method works as follows:[212]

> **Step 1: Compute the "but-for" price for each transaction in the data.** This is done by using the overcharge regression to calculate an estimated price of each Defendant-Direct Purchaser Pork transaction *but-for* the conspiracy. This is done by using standard regression prediction methods, after manually setting the effect of the Conduct variable *in the Conduct Period* (not the *benchmark period*) to zero. This simulates the price "but-for" the Conduct.
>
> **Step 2: Compare the actual price paid to the "but-for" price.** The difference between the actual and "but-for" price is the overcharge estimate for each transaction.

119. The estimation of the "but-for" price in Step 1 results in a unique estimate for each transaction in the database, because it uses the supply, demand, and fixed effects that pertain to that specific product, Defendant, and Direct Purchaser combination at a specific point in time. Step 2 then assesses how the real-world price *with* the Conduct present compares to the "but-for" price in a world *without* the Conduct. If the transaction's "but-for" price is less than the price actually paid, it implies that this transaction would have paid a lower price absent the Conduct. Note that I do not simply reduce the *actual* prices paid by the overcharge amount—because doing so would mechanically generate 100 percent impact. Instead, I allow the data to inform the "but-for" price the regression model predicts would prevail absent the Challenged Conduct.

120. The final component is the determination of whether Direct Purchasers (who make many transactions with Defendants) are impacted over the Class Period. My initial analysis demonstrated that 99.78 percent of all Direct Purchasers—representing over 99.99

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[210] *Id.*

[211] Haider Report ¶154.

[212] Singer Report ¶170. *See Reference Manual* 305 n.4. *See also Reference Manual* at 432, describing the standard methodology for computing damages. ("The characterization of the harmful event begins with a clear statement of what occurred. The characterization also will include a description of the defendant's proper actions in place of its unlawful actions and a statement about the economic situation absent the wrongdoing, with the defendant's proper actions replacing the unlawful ones (the but-for scenario). Damages measurement then determines the plaintiff's hypothetical value in the but-for scenario. Economic damages are the difference between that value and the actual value that the plaintiff achieved.").

percent of the volume of commerce of Pork—were overcharged at least once during the Class Period.[213]

121. Dr. Haider points out that after I perform Step 2, 85 percent of *transaction*s in Defendants' sales data (representing 87 percent of sales revenue) show lower "but-for" prices than actual world prices, which she claims means that some transactions escaped the overcharge.[214] If Dr. Haider believes that individual Direct Purchasers may have escaped injury on certain transactions, the appropriate analysis to apply next for determining common impact is not to look at transactions in isolation, but to look at each Direct Purchasers' transactions on net to determine if all or virtually all Direct Purchasers were impacted. That is, if I sum "but-for" volume of commerce ("but-for" price multiplied by quantity sold) and actual volume of commerce for each Direct Purchaser and compare the two, net harm occurs when the Direct Purchaser would have been better off *on net* (across all transaction in the Class Period) absent the Challenged Conduct. The result of this analysis demonstrates that 99.96 percent of the volume of commerce of Pork during the Class Period had a higher actual price than the "but-for" price, and that 98.75 percent of Direct Purchasers suffered antitrust injury on net.

TABLE 14: IN-SAMPLE IMPACT PREDICTION
(DIRECT PURCHASERS WITH NET TRANSACTIONS IMPACTED)

| Direct Purchaser | Volume of Commerce | Direct Purchasers |
|---|---|---|
| Impacted on Net | 99.96% | 98.75% |
| Not Impacted on Net | 0.04% | 1.25% |
| Total | 100% | 100% |

*Notes*: Regression Model 4 used from Singer Report Table 12.

122. Dr. Haider's "illustration" of a "methodological error" is a just demonstration that regressions are not *perfect* predictors of a dependent variable. Dr. Haider shows that if one ignores Step 1 entirely of the in-sample prediction methodology, and simply compares actual price paid to the overcharge regression equation's estimated prices, there is an approximate 50-50 split over and under the regression prediction. This is exactly what is to be expected. Because my overcharge regression model explains 93 percent of the variation in price, over and above that which could be explained by a naïve estimate based

[213] Singer Report ¶170, Table 16.

[214] Dr. Haider claims that this means there was no overcharge to pass on to Indirect Purchasers on 15 percent of transactions. Dr. Haider's claim would only make sense if each Direct Purchaser only made a single purchase from Defendants during the Class Period. This is not the case. Even if a single Direct Purchaser made only made twelve purchases for one single product in one single year, and if the in-sample prediction method shows that 85 percent of transactions are impacted—meaning each transaction has a 15 percent chance to escape impact—that Direct Purchaser would have less than a *one in seven billion chance* to escape overcharge on all 12 purchases for *one product* for *one year*. (Equal to $12^{0.15}$).

on the mean price alone. An R-squared of 93 means that only 7 percent of price variation is unexplained. Indeed, in a functioning regression model, we would *expect* the small amount of variation to fall on either side of the estimated regression values evenly. That is, the 50-50 split is the *benchmark*. The fact that 85 percent of transactions in the in-sample prediction method I use show a "but-for price" below the actual price, when the *expected value* in the case of no overcharge is 50 percent demonstrates that the model is detecting impact beyond random chance.

123. To prove this point, I demonstrate below that the model is functioning correctly by looking at the *volume of commerce* impacted rather than a count of transactions impacted. If Dr. Haider is correct, and the in-sample prediction method is just generating statistical noise and false positives, then we should expect that the *net volume of commerce impacted under the in-sample prediction method to be approximately zero*. Table 15 below shows this is not the case. It first shows the results of my in-sample prediction, which uses Step 1 and Step 2 described above. As before, 85 percent of *transactions* are impacted. Now, however, we can see that the in-sample prediction method shows a *net overcharge* of approximately 12.2 percent across all of the transactions in the data. That is, if I add up the differences between the actual price and the "but-for" price across all transactions, the difference in value between the actual and "but-for" volume of commerce is 12.2 percent—remarkably close to the coefficient from my overcharge regression. In contrast, Dr. Haider' "illustration" that actual prices fall 50-50 on either side of the regression line is associated with approximately zero *net overcharge*. That is, if you add the differences in the actual prices and regression' estimated prices, they net to approximately zero, just as theory would predict.

TABLE 15: THE IN-SAMPLE IMPACT PREDICTION DEMONSTRATES NET OVERCHARGES TO DIRECT PURCHASERS, DR. HAIDER'S METHOD ILLUSTRATES STATISTICAL NOISE

| Model Comparison | Transactions Impacted | Overcharge as Share of Volume of Commerce |
|---|---|---|
| In-Sample Prediction (Step 1 + Step 2) | 85.4% | 12.2% |
| Haider Illustration (Only Step 2) | 50.2% | 0.5% |

*Notes*: Regression Model 4 used from Singer Report Table 12.

124. This demonstrates that widespread impact can be shown using the in-sample prediction method. If Dr. Haider were right, we would not see a net overcharge in the volume of commerce in the in-sample prediction method. Importantly, this same method demonstrates that approximately *99 percent* of Direct Purchasers were overcharged on either a "harmed once" or "harmed on net" basis. This impacted figure increases to *over 99.9 percent when* weighted by the volume of commerce these impacted Direct Purchasers represent. Combined with my other two methods demonstrating classwide impact, plus Dr. Haider's novel Direct Purchaser regression which *also* demonstrates classwide impact, I

conclude that all or virtually all Direct Purchasers were overcharged during the Class Period.

#### c. *The In-Sample Prediction Method Is in No Way Circular*

125. Dr. Haider also alleges that the in-sample prediction method is "circular." According to Dr. Haider, my "Proposed methodology is circular because the starting point of the analysis is a built-in overcharge across all transactions by direct purchasers (either of a particular cut or for all cuts combined). The appearance that they perform a transaction-by-transaction assessment of direct purchaser overcharges is purely superficial. This approach does not test whether individual direct purchasers sustained overcharges."[215] This is wrong and not what circular means.

126. A circular approach is Dr. Haider's use of "hog prices," as I explain in Part II.B.2 and Figure 5—that is—hog prices determine Pork prices, but Pork prices determine hog prices. The starting input ends up being changed by the output.

127. By contract, the in-sample prediction method is a straight line with no feedback. The regression estimates the overcharge percent. But-for prices are predicted using the *reduction* in the overcharge percent. Those but-for prices are compared to actual prices. At no point does the regression re-estimate the overcharge based on the results of the in-sample prediction.

### 5. Dr. Haider's Alternative Pricing Structure Analysis Shows a Pricing Structure

128. In addition to in-sample prediction, in my initial report I used a regression analysis to establish that there is class-wide evidence of a common pricing structure among Pork products that would transmit artificially inflated prices broadly across the Class.[216] Dr. Haider does not dispute this method or the fact that it has been used in previous cases to demonstrate class-wide impact. Instead, she claims my analysis is unreliable because I failed to use the same supply and demand variables that I used in overcharge regression.[217] When Dr. Haider includes these same supply and demand variables, she *claims* that my conclusions do not hold—but in reality, her own analysis unambiguously shows evidence of a pricing structure.

129. As I explain in a moment, I do not believe it is appropriate to include the supply and demand variables in this regression. Nevertheless, even if this is done, the

[215] Haider Report ¶151.
[216] Singer Report ¶171.
[217] Haider Report ¶176. Note: Dr. Haider also claims that my pricing structure analysis fails because it relies on my overcharge regression to show overcharges in the first place. Since this is not a criticism of the pricing structure regression itself, I ignore this claim.

results are fundamentally unchanged. Below is a trimmed version of Dr. Haider's Exhibit D-34 that only include fixed effects.[218]

TABLE 16: DR. HAIDER'S EXHIBIT D-34, FIXED EFFECTS REGRESSIONS

| | Estimated Coefficient on Other Defendants' Average Same-Category Prices | Estimated Coefficient on Other Customers' Average Same-Product Prices |
|---|---|---|
| Cut | Add Demand and Supply Factors and Processor-Product-Customer ID Fixed Effect[3] | Add Demand and Supply Factors and Processor-Product-Customer ID Fixed Effect |
| [a] | [c] | [e] |
| Bacon | 0.768* | 0.267* |
| Belly | 0.842* | 0.682* |
| Loin | 0.768* | 0.299* |
| Rib | 0.767* | 0.397* |
| Shoulder | 0.899* | 0.747* |

130. These results provide strong evidence of a common pricing structure. The results in column [c]—Dr. Haider's variant pricing structure regressions, when you include all of the supply and demand variables and fixed effects from my overcharge regression—reveal that prices move together at a rate of 0.77–0.90 cents to the dollar, depending on the primal. In my initial formulation, I found this rate was 0.81 cents to the dollar.[219] Column [e], which switches the lens of analysis to customers rather than Defendants, shows a range of 0.26-0.75 cents to the dollar. My initial formulation found 0.77. In other words, Dr.

[218] Haider Report D-34. Columns [c] and [e] are the equivalent of my overcharge specification, in that they include all of the supply and demand variables I use, as well as Processor-Product-Customer fixed effects. I do not run the overcharge regression without fixed effects, so I ignore columns [b] and [d]. At deposition, Dr. Haider could not articulate why she added supply and demand factors but not the fixed effects. Haider Dep. at 287:19-288:20.

[219] Singer Report ¶173 ("Specifically, increases in the average category price among other Defendants is associated with a 81 percent increase in price paid by a Direct Purchaser to the particular Defendants. Similarly, within a Defendants' data, increases to specific product prices paid by other Direct Purchases are associated with a 77 percent increase in the price paid by a particular Direct purchaser. These results are consistent with the existence of a pricing structure and demonstrates that pork prices show a strong tendency to move together. This implies that any overcharge to a product or product category would have been broadly felt by Direct Purchasers across Defendants.").

Haider's primary criticism of my pricing structure model yields nearly identical results. She ceded this point at deposition.[220]

131. Moreover, Dr. Haider's criticism that I ought to have included the same supply and demand variables is unfounded. In describing the pricing structure regression, I wrote in my initial report that this analysis is "Similar to analyses performed by Plaintiffs' expert economist, Professor Edward Leamer, in *High-Tech Employee*."[221] Dr. Haider seizes upon this, noting my decision not to include additional independent variables, and makes the bold statement that "Dr. Singer's claim that he followed Dr. Leamer's approach is incorrect and misleading."[222] Again, Dr. Haider charges me with misleading the reader.

132. Besides the pedantic point that the phase "similar to" does not mean the same thing as "followed," Dr. Haider does not explain *why* my omission of these supply and demand variables in this analysis is wrong. Nor does she explain *why* her inclusion of them is right. She cannot because there is no reason for either. The entire purpose of these pricing structure regressions is to assess whether there is class-wide evidence of a common pricing structure—it is *not* the objective of this regression isolate a *causal relationship* between one price change and another. By looking only at prices without additional control variables, we can interpret the regression coefficients as correlations between prices of similar product-customer-Defendant combinations. We obtain no additional benefit–and make interpretation of the coefficients more convoluted – by adding in additional right hand side variables. And, as demonstrated above, doing so does not fundamentally change the overarching results of the analysis.

### C. Dr. Haider's Pass-Through Analyses Show 100 Percent Pass-Through

133. The arguments Dr. Haider advances in Section VIII of her report all pertain to my analyses showing how Direct Purchasers would pass-through higher Pork prices to indirect consumer class members. I note again that Dr. Haider's criticisms of my proposed class-wide methodologies in this section are with their specific *implementation* rather than with the underlying *framework* of the methodology.

134. Critically: Dr. Haider's own variants of my pass-through model *still find economically and statistically significant pass-through of 100 percent* using a linear-log

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[220] Haider Dep. 285:15-286:2 ("A. Yes. So Column C would -- the .768 would be interpreted, again, just taking Dr. Singer's work and doing -- you know, and seeing how the results change, depending on which dem -- which factors he -- he includes, if he just includes the explanatory factors that are, you know, time-varying, then you get the negative .28 percent. You also put in the fixed effects, you get .768, and the way to interpret that is a hundred percent increase in the average price among other defendants is associated with a 76 percent increase in the price of bacon for a given defendant.").

[221] Singer Report ¶172.

[222] Haider Report ¶178.

model. That is, even Dr. Haider's rebuttal analyses, taken at face value, still show that overcharges to Direct Purchasers would have been passed on to Class Members.

135. Dr. Haider has nothing to rebut the economic literature and theory I cite which demonstrate that pass-through rates will approximate 100 percent in a competitive market. She does not contest the record evidence from the case that shows that industry experts expected a pass-through rate of 100 percent, and that Defendants themselves believed that [redacted][223] This silence should be taken as an admission of this evidence.

136. Moreover, since the filing of my initial report, new record evidence from Pork distributors and retailers consistently pass cost increases through to consumers.[224] Resellers have testified that they consistently use the same constant markups[225] or constant

[223] Singer Report Part V.C. SMITHFIELD01062391.

[224] Several pork distributors have testified that they pass on price increases to their customers. [redacted]

[225] [redacted]

margins[226] to pass on costs to customers. Nearly every pork distributor deposed in this case has testified to relying on markups or margins when setting the price of pork that they resell to their customers. Both of these result in the same outcome: they ensure that any increases in the cost of the underlying product are passed on to customers.[227] Moreover, resellers testified that they maintained constant markups and margins over the Class Period.[228]

137. Ignoring my economic theory and record evidence from industry analysts, Direct Purchasers, and Defendants themselves, Dr. Haider claims I do not demonstrate pass-through, offering her own variants of my pass-through regression model and my pricing structure regression. Yet critically: Dr. Haider's own variants of my pass-through model *still finds economically and statistically significant pass-through of 100 percent*. And Dr. Haider's variation of my pricing structure regression *still demonstrates a pricing structure for Pork products*. That is to say, even taking Dr. Haider's rebuttal analyses at face value, Dr. Haider still shows that overcharges to Direct Purchasers would have been passed on to Class Members. I reply to each of Dr. Haider's pass-through criticisms and claims below.

### 1. My Initial Pass-Through Regressions Show All Costs, Including Overcharges, Would Be Passed Through

138. Dr. Haider claims that my pass-through analysis tests the "general proposition that any cost change incurred by Direct Purchasers (regardless of whether it

[redacted]

included an alleged overcharge) was, on average, passed through downstream."[229] This is bizarre criticism and completely irrelevant.

139. Recall that the pass-through analysis works, essentially, by seeing if resellers increase their prices when the cost of goods go up. My regression analysis, consistent with theory and evidence, shows that they do. Dr. Haider appears to be alleging that I should have decomposed the cost increases by *why* the cost went up. In other words, she is alleging that resellers might pass through a 12 percent cost increase *differently* if they realized that the increase was due to an anticompetitive overcharge than, rather than competitive factors. This is divorced from reality. Cost is cost. There is no evidence that resellers consider a cost increase when determining a price change.

### 2. Accounting For Product Specific Attributes Still Shows 100 Percent Pass-Through

140. In my analysis of pass-through using the third-party reseller data, I regress the sales price of a Pork product on its cost, controlling for the type of primal cut the product represent (Bacon, Belly, Loin, Rib, and Shoulder) and the calendar month the sale occurs in to account for product seasonality.[230] Dr. Haider points out that this pass-through regression analysis does not additionally include product specific fixed effects like my overcharge regression.[231] Meaning, while I control for the fact that Bacon might be priced differently than Loins, I do not control for within-product difference between Bacon products (Bacon 123 might be priced differently than Bacon ABC). Dr. Haider points out that by not including product-specific fixed effects, the regression might simply be picking up the fact that "larger packages of bacon are more expensive than smaller ones, consistent with their higher costs."[232] While the regression would still be appropriately measuring how a change in cost leads to a change in price, even accepting this criticism and making modest adjustments to the regression, the analysis still demonstrates uniformly positive pass-through of cost increases.

141. Before I explain why product-specific fixed effects are not appropriate in the pass-through regression, let me be clear: Adding them it makes no functional difference to the analysis or conclusions of pass-through. While Dr. Haider is fast to point out individual retailers where pass-through rates are lower than the original method, she does *not* tell the

[229] Haider Report ¶210.
[230] This is my "cut-by-month" variable, described in Singer Report ¶155.
[231] Haider Report ¶¶211-213 ("Dr. Singer does not account for differences in product attributes among pork products of a given cut. As such, he relies on between-product variation and estimates the average dollar increase in prices to proposed Consumer IPP class members associated with a one percent increase in the cost incurred by the retailer … In fact, Dr. Singer himself accounts for differences in product attributes in his overcharge regressions (the Defendant/product/customer indicator variables account for average price differences across the numerous products).").
[232] Haider Report ¶211.

reader that average pass-through rates *still result in 100 percent pass-through* for Distributors and *90 to 100 percent pass-through* for Retailers on a weighted average basis when product-specific fixed effects are included. Below, I replicate the exact modifications of Dr. Haider's Exhibit 42 and present them in the same format I did in my initial report.

TABLE 17: DR. HAIDER'S EXHIBIT 42 PASS-THROUGH ANALYSIS USING PRODUCT FIXED EFFECTS – ALL DISTRIBUTORS

| Entity | *Linear-Levels Model* | | *Linear-Log Model* | | | | Share of Defendant Distributor Sales (2018) | Weighting (2018 Own-Data Sales) |
|---|---|---|---|---|---|---|---|---|
| | Pass-Through | R-Squared | Pass-Through | Price / Cost Ratio | Elasticity | R-Squared | | |
| [redacted] | | | | | | | | |

*Notes:* Any third party with Sales in Defendants' Data or Share of Category Sales equal to "—" is not accounted for within the Defendants' data. This could be due to (1) an inability to match the entity name with the customer name within the Defendants' data, or (2) the third party purchasing product from another vendor indirectly, rather than through the Defendants. For weighting, [redacted] uses 2019 data (2018 was not produced). Any third party with Sales in Defendants' Data equal to 0.0% has a negligible amount of direct purchases from Defendants.

TABLE 18: DR. HAIDER'S EXHIBIT 42 PASS-THROUGH ANALYSIS USING PRODUCT FIXED EFFECTS – ALL RETAIL STORES

| Entity | *Linear-Levels Model* | | *Linear-Log Model* | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Pass-Through | R-Squared | Pass-Through | Price / Cost Ratio | Elasticity | R-Squared | Share of Defendant Retail Sales (2018) | Weighting (2018 Own-Data Sales) |
| [redacted] | | | | | | | | |

*Notes:* Any third party with Sales in Defendants' Data or Share of Category Sales equal to "—" is not accounted for within the Defendants' data. This could be due to (1) an inability to match the entity name with the customer name within the Defendants' data, or (2) the third party purchasing product from another vendor indirectly, rather than through the Defendants. For weighting, [redacted] uses 2020 data (2018 was not produced). Any third party with Sales in Defendants' Data equal to 0.0% has a negligible amount of direct purchases from Defendants.

142. Dr. Haider's "finding" that some Retailers show lower pass-through when using product specific fixed effects has a simple explanation: Her use of product specific fixed effects yields too few observations per product for the regression to run properly. This is because there are on average only 62 datapoints (observations) per product in the Retailer data. For example, [redacted] has only 36 observations per product on average and some products have only *two observations*.[233] ([redacted], which shows a pass-through

[233] [redacted] only has two in-class products. Similarly, [redacted] only has eleven in-class products. Of these eleven products, five never vary in unit cost by more than five percent of the

rate of approximately 100 percent under this method, has 108 observations per product on average.) Earlier in her report, when Dr. Haider allowed the Conduct to vary by Direct Purchasers, she made sure that each Direct Purchaser had "at least 100 observations" to avoid the exact problem that "small sample sizes" often mean that the parameters "cannot be estimated precisely."[234] If I apply Dr. Haider's own sample size rule here and only estimate the regression on products with 100 or more observations, the remaining retail products and retailers with sufficient data show more expected pass-through rates.

TABLE 19: PASS-THROUGH ANALYSIS DR. HAIDER'S EXHIBIT 42, LIMITED TO PRODUCTS WITH 100 OR MORE OBSERVATIONS RETAIL STORES

| Entity | *Linear-Levels Model* | | *Linear-Log Model* | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Pass-Through | R-Squared | Pass-Through | Price / Cost Ratio | Elasticity | R-Squared | Share of Defendant Retail Sales (2018) | Weighting (2018 Own-Data Sales) |
| [redacted] | | | | | | | | |

*Notes*: Any third party with Sales in Defendants' Data or Share of Category Sales equal to "—" is not accounted for within the Defendants' data. This could be due to (1) an inability to match the entity name with the customer name within the Defendants' data, or (2) the third party purchasing product from another vendor indirectly, rather than

average unit cost for that product. This accounts for more than one third of the in-class [redacted] observations. Furthermore, [redacted] all have zero in-class products with at least 100 observations, with [redacted] both containing zero in-class products with more than 50 observations.

[234] Haider Report ¶144 n. 263 ("If any of the Class Experts attempts to argue that allowing their average overcharge to vary across individual customers is inappropriate because some Direct Purchasers have small sample sizes and thus the overcharge variable cannot be estimated precisely for these purchasers, this would be incorrect. First, each Direct Purchaser that has a separate estimate has at least 100 observations (50 observations in the benchmark period and 50 observations in the proposed class period).").

through the Defendants. For weighting, [redacted] uses 2020 data (2018 was not produced). Any third party with Sales in Defendants' Data equal to 0.0% has a negligible amount of direct purchases from Defendants.

### 3. Dr. Haider's Individual Product Criticisms Are a Cherry-Picking Exercise

143. Dr. Haider claims that my use of an average pass-through is flawed because it does not allow for the possibility that intermediaries passed through cost changes for some products but not others. Similar to Dr. Haider's variant overcharge regression allowing the conduct to vary by Direct Purchaser,[235] Dr. Haider allows the pass-through estimates to vary by each of the top twenty products sold by four example retailers.[236] She then highlights 27 products from these four retailers that are no longer positive and statistically significant when examined on a product-by-product basis. This analysis is flawed in its construction. Even if it was not flawed, her analysis is not evidence that costs are *not* passed through to consumers.

144. *First*, from a theoretical standpoint, as I explain above in Part II.B an economist must have an *a priori* reason to impose a structural break in a regression analysis. Dr. Haider gives no reason why she believes pass through would differ for the top twenty selling products for a firm. Dr. Haider's continued use of a Chow test, as I explain in Part II.B.3 above, is again without economic basis and thus without merit. I am aware of no theoretical underpinning (aside from loss leader products, which I discuss later) why firms would decide to pass through costs at different rates. Dr. Haider offers none. Nor does she explain why she picked only four of the sixteen retailers to highlight.

145. *Second*, Dr. Haider's analysis is cherry-picked on a tiny fraction of the overall third-party data. Dr. Haider only performed her top twenty individual product analysis on four third parties. This data only reflects *1 percent of all the third-party data I used in my pass-through regression*.[237] Simply expanding her top twenty analysis to all third parties undermines her point: When I replicated Dr. Haider's top twenty individual product analysis for all third parties, 97 percent of all top twenty product sales had positive and statistically significant pass-through.[238]

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[235] I discuss this in Part II.B.3.

[236] *Id.* ¶¶214-218.

[237] Dr. Haider's analysis uses 14,145 observations. My pass-through regressions use 1,404,722 observations. 14,145 / 1,404,719 = 0.01.

[238] A significant portion of the third parties I analyzed had little to no products affected by the individual product analysis. [redacted] all have positive and statistically significant results across every one of their top twenty ranked products. [redacted] both only had a single top twenty product that did not meet these criteria.

146. *Third,* Dr. Haider's individual product analysis turns on very few statistical observations. Econometricians generally regard 30 observations as the bare minimum sample size needed for a regression to produce unbiased results,[239] while other practitioners suggest that even 30 is too low.[240] Indeed, Dr. Haider acknowledges this in her report. She requires a minimum of 50 observations when she performs her overcharge regression where the conduct varies by Direct Purchaser.[241] Using Dr. Haider's own sample size rule from her variant Direct Purchaser regression, 14 of the 27 products Dr. Haider highlights from [redacted] have too few observations to be estimated. For instance, each of the top twenty products sold at [redacted] have fewer than 30 observations total. For [redacted], all top twenty products have fewer than 50 observations. For [redacted], two of the eleven products highlighted have fewer than 50 observations.

147. *Fourth,* the remaining products Dr. Haider claims have statistically insignificant or negative pass-through all have reasonable explanations for why that is the case. None of these remaining products are evidence that retailers do not pass-through costs on to customers. In each case I detail below, the story for that product is a variant of: "Price changes for reasons unrelated to a cost increase." There is only a single product in Dr. Haider's entire individual product analysis where cost appears to increase (by 13%) and price does not.

148. Starting with Dr. Haider's four [redacted] products: Dr. Haider's Appendix F-42 and F-43 charts of [redacted] In the case of these two products, the variations in price and cost are unrelated to each other. [redacted] decreased the price on both tenderloins *for reasons unrelated to cost*. This can be seen in the price reductions that occurred [redacted]. I cannot say why [redacted] reduced price, but presumably it could be explained by demand side factors, such as shifting consumer preference related to the tenderloin product category. The regression does not attempt to explain all factors which might influence price changes unrelated to cost. So rather than discarding this product's observations because there is no cost or price variation, it simply finds there is no positively and statistically significantly relationship between cost and price.

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[239] A. H. STUDENMOND, USING ECONOMETRICS: A PRACTICAL GUIDE, 368 (Pearson 7th ed. 2016) ("[S]amples below 30 should be avoided, in part because of this bias and in part because hypothesis testing can become unreliable.").

[240] JEFFREY M. WOOLDRIDGE, INTRODUCTORY ECONOMETRICS: A MODERN APPROACH, 176 (Cengage Learning 5th ed. 2013) ("Some econometricians think that $n = 30$ is satisfactory, but this cannot be sufficient for all possible distributions of $u$. Depending on the distribution of $u$, more observations may be necessary before the central limit theorem delivers a useful approximation."). *Supra,* STUDENMOND at 368 ("Our recommendation … is to aim for a sample of at least 50 observations. The smaller the sample, the more likely you are to encounter bias[.]").

[241] Haider Report ¶144 n. 263.

149. The other two [redacted] products highlighted by Dr. Haider, "[redacted], have clear explanations. [redacted] *decreased* over time. [redacted] did not pass on these savings to customers. Meanwhile, the unit cost for [redacted] remained constant across its entire time frame, except for [redacted]. In order to estimate an individual product's pass-through correctly, one needs ample variation in its cost. Virtually no variation in cost results in no variation in price. This in no way refutes my pass-through results.

150. Similarly, three of Dr. Haider's [redacted] products have miniscule changes in cost, Dr. Haider's Appendix F-34, F-35, and F-40 graphs. Additionally, one [redacted] product only has a single outlier cost causing a meaningful cost change. Dr. Haider's Exhibit F-32 shows [redacted] The cost then immediately reverts to [redacted]. This temporary unexplained spike in the data could simply be a data entry error. Regardless, even if this were an actual one-month jump in cost, both products have essentially no other change in cost. The single cost outlier is thereby absorbing all the regression variation. The [redacted] products all have little cost change from one month to the next. For all nine highlighted [redacted] products with more than 50 observations, the average cost change by month is less than one percent.[242] Even when there is cost variation, Dr. Haider fails to show that the fluctuations in price are purely influenced by the cost. There are both increases and decreases in the price that occur when there is no change in cost. Importantly, there is never a sustained increase in cost associated with no change in price. Therefore, Dr. Haider is largely examining changes in price that are a result of something other than the changes in cost, rather than finding that there is a sustained increase in cost that is not passed through to consumers.

151. *Finally*, Dr. Haider's individual product analysis is mooted by her own demonstration of pass through using product-level fixed effects, as I explain in Part II.C.2. Critically, her own pass-through analysis finds positive and statistically significant results

[242] When averaging all monthly cost change percentages (calculated as the unit cost in one month minus the unit cost in the previous month divided by the unit cost in the previous month), the following products have the following average monthly percentage cost change: [redacted]

for each of the four examined third parties.[243] It is therefore both unnecessary and misleading to suggest that these individual product analyses alter my pass-through findings. Dr. Haider's own results show that, even when controlling for individual product differences through the use of product fixed effects, there is significant pass-through for each example third party.

### 4. Dr. Haider's "Extrapolation" Arguments Have No Merit

152. At the time of filing my initial report, I reported that the third-party firms that provided pass-through data collectively accounted for approximately 28 percent of Defendants' Direct Purchaser Pork sales in 2018, the most common year of data obtained.[244] For retailers specifically, the firms in data represented 23 percent of Defendants 2018 sales, and for distributors this figure was 43.7 percent. Since the filing of that report, additional third-party data has been made available to me, such data from the retail giant [redacted]. When I include this additional third-party retail data and re-run my pass-through analysis, the **retail firms in data now represent 50.3 percent of Defendants 2018 sales** and continue to demonstrate pass through-through rates of approximately 100 percent. I produce this table in Appendix 3.[245]

153. Dr. Haider alleges that this third-party sample is "only a small subset of the intermediaries at issue" and that I have "assumed" that my pass-through conclusions can be "extrapolated" to the intermediaries who have *not* provided usable data.[246] She further claims that her testing reveals that it is inappropriate to extrapolate this data.[247] I have already debunked Dr. Haider's alternative pass-through tests in Part II.C.2 above, so I will instead explain why Dr. Haider's critique of the my pass-through analysis is wrong.

154. It is important to recall that my empirical analysis of pass-through is one of three ways I demonstrate that any overcharges would be passed through to Class members. In my initial report, I demonstrated that:

- Economic theory predicts that firms will pass through 100 percent of marginal cost increases in perfectly competitive markets in the long run.[248]

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[243] Haider Report Appendix F-14 (showing that Dr. Haider's pass-through with product fixed effects results in [redacted]).

[244] Singer Report ¶182.

[245] The [redacted] data was made available to shortly before filing this report. I reserve the right to amend the process for cleaning and preparing this data. I apply the same pass-through regression analysis methodology as my initial report.

[246] Haider Report ¶218.

[247] *Id.*

[248] Singer Report ¶177. In my report I note, however, that pass-through can be more or less than 100 percent in the presence of imperfect competition.

- Documentary evidence indicates that Defendants and industry analysts believe costs would be passed through,[249] such as a one report which states that [redacted][250]
- My empirical analysis of the available third-party data shows that pass-through is approximately 100 percent.

Dr. Haider *does not* address the underlying economic theory. Dr. Haider does not address the record evidence. Dr. Haider cannot even dispute the results of the 28 percent sample—as I showed above, her own variants of my pass-through analysis yield approximately 100 percent pass through. Instead, Dr. Haider claims I have inappropriately extrapolated the results of a 28 percent sample to the population.

155. Dr. Haider has invented the idea that I "assumed" and "extrapolated" anything. The word "extrapolate" does not appear in my report, and where I do use the word "assume", it would take a tortured reading to twist it into Dr. Haider's representation.[251] What I wrote was that that "[e]conomic theory and empirical evidence demonstrate that any overcharge paid by Direct Purchasers due to the Challenged Conduct were passed on to the Class Members."[252] Put differently: All of the available evidence I reviewed—theoretical, documentary, and empirical—all support the same conclusion that Class members would have had the overcharges passed on to them at a rate of approximately 100 percent. I understand that fact discovery is now closed, although discovery continues for opt-outs to the direct purchaser litigation. It is my understanding that some of these opt-outs include distributors and grocery stores who sell to the consumer indirect purchaser class. As more third-party evidence becomes available to me, I will analyze it and see if the conclusion continues to hold.[253]

156. For that third-party data that we do have, Dr. Haider makes the additional incorrect claim that my third-party data analysis "excludes a large share of relevant pork sales" and lists several examples such as [redacted][254] This is either a gross

[249] Singer Report ¶185-189.

[250] CLMNS-0000081356 and CLMNS-0000081357, [redacted].

[251] The term "assume" in this context only appears for my demonstration of how it is possible to calculate damages using evidence and methods common to the class. Singer Report ¶197 ("I limit pass-through to 100 percent for the purposes of performing these calculations damages calculations.").

[252] Singer Report ¶175.

[253] As the subpoenaed third-party data is *not* a random sample (for a variety of legal and practical reasons), I am not aware of any threshold proportion that would allow me to statistically extrapolate the results of the sample to the population.

[254] Haider Report ¶219.

misrepresentation of my analysis or reveals Dr. Haider's ignorance on how this data was constructed and analyzed.

157. Nearly all of the third parties subpoenaed supplied purchase and sales data separately from two independent datasets.[255] To compare costs with prices, I needed to merge the two datasets together. In a perfect world these datasets would merge across all products in all time periods at a 1:1 match rate, but this is almost never the case in practice. There are many reasons why datasets might only partially match: The data can be from different databases that do not have the same product IDs,[256] products can be transformed ("breaking box", repackaging items) from purchase to retail,[257] the datasets can be from

[255] A small portion of third parties supplied data with both the unit cost and unit price in one dataset, allowing me to calculate pass-through without relying on merging two distinct databases.

[256] *See, e.g.,* "[redacted] Responses to Data Production Questions" [redacted].

[257] *See, e.g.,* July 6, 2021 Email from Chris Chau, Davis Wright Tremaine LLP, to Jessica Thompson, Hagens Berman Sobol Shapiro LLP, In RE: [redacted]: Pork Anti-Trust Litigation / 18-CV-1776 (JRT/HB) ([redacted] *See also, e.g.,* May 25, 2021 Email from Mickey Stevens, Gustafson Gluek PLLC, to Jordan D. Weinreich, Sherman Atlas Sylvester & Stamelman LLP, In re Pork Antitrust Litigation - Third Party Subpoena - [redacted].

differing time periods,[258] or there might be unexplained recording gaps in the data.[259] All of these can result in a partial match rate.[260]

158. This mismatch is what Dr. Haider is complaining about. Every time a sales transaction cannot be matched with a purchase transaction, Dr. Haider counts this as a data "exclusion," suggesting that it is a practical alternative to the merging process that I employed. Note that Dr. Haider does not attempt to "fix" this data merging issue, because it is not possible to do so.[261] At deposition, Dr. Haider admitted [redacted][262] In any event, it remains the case that my conclusions are based on data for 28 percent of Defendants' Direct Purchaser Pork sales in 2018.

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[258] *See, e.g.,* [redacted] Data Production Questions - Pork Litigation [redacted] (Purchase Questions – Q1: [redacted]

[259] *Supra,* [redacted] Data Production Questions - Pork Litigation [redacted] Answers at General Question 1 [redacted] *See also* March 8, 2022 email from Douglas Patton, Kenny Nachwalter, to Blaine Finley, Cuneo Gilbert & LaDuca, LLP, Pork Antitrust - Follow-Up Questions re: [redacted]

[260] *See* Haider Report ¶219 n. 453 (Dr. Haider points out that if you only limit to only the actual matched data used in the pass-through regression, I directly empirically measure pass through for "only" 13 percent of Defendants' direct sales.).

[261] Dr. Haider manually identifies a small number of [redacted] products in [redacted] sales data by searching online for them. It is notable that while Dr. Haider describes this as a publicly available crosswalk, she clearly manually connected the UPCs with corresponding websites. She only did this for 200 products, rather than the complete [redacted] sales products, illustrating the unreasonable expectation of this complete task. Furthermore, she did not rely entirely on this crosswalk, instead manually adjusting some product descriptions based on item number alone, with no corresponding URL provided. *See* Haider Report n. 457 and Haider workpapers. This is changes nothing: There is no way to incorporate these observations into the pass-through analysis because none of the class products she identifies have corresponding purchase order observations.

[262] Haider Dep. at 292:16-23 [redacted]

159. Moreover, Dr. Haider never identifies a reason why my pass-through estimates would not be representative of all relevant Pork products. Among the four third-party examples that Dr. Haider highlights, all have at least 84 products and over 2,400 observations used in their regressions, providing ample variation and sample size to estimate pass-through.[263] As stated in the *Reference Manual* when census data does not include every unit in a whole population "one must ask whether the missing data are likely to differ in some systematic way from the data that are collected."[264] There is no reason to think that here.

### 5. Dr. Haider's Alleged Pricing Strategy Arguments Make No Difference

160. In Part VIII.C of her report, Dr. Haider makes various claims about retailer pricing strategies that purportedly affect my analysis of pass through. None of these arguments have any validity. Further, Dr. Haider only raises these points as hypothetical problems. She does not perform any test to show how these pricing strategies could affect pass through, nor does she even explain how such tests could be hypothetically performed.

161. First, Dr. Haider claims that pass-through would be affected by focal point pricing, and that retailers would not necessarily shift away from focal point prices in response to a small cost change.[265] To corroborate her claim, Dr. Haider's Exhibit 44 shows the number of products sold that end in a "9" (e.g., $2.99 or $1.49). This logic is broken. Dr. Haider's own exhibit disproves her point: Even if retailers *only* price products ending in a "9," they are more than able to pass through small cost changes to consumers.

162. For example, suppose that a retailer sells a product for $0.99. If the retailer raises this price by ten cents to the next nearest focal point price of $1.09, that is a 10.1 percent price increase.[266] This 10.1 percent increase is *less than my estimated overcharge* of 12 percent. As base prices become larger, these percentages become even smaller (e.g., a price hike from $5.49 to $5.59 is only a 1.8 percent increase). Table 20 below displays similar calculations for all ten-cent price increases Dr. Haider suggests. Each combination of a column ("Dollar") with a row ("Cents") represents the resulting focal point price after a ten-cent price increase. The corresponding cell amount provides the price increase in percentage terms. For instance, going down the first column from a price of $1.09 to $1.19 represents a 9.2 percent increase, while going from a price of $1.19 to $1.29 represents an 8.4 percent price increase. The point is that all ten-cent price increases fall under my 12 percent overcharge estimate, suggesting that retailers would *always* pass-through a portion of the overcharge to consumers even under a focal point pricing strategy.

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[263] Singer Report Appendix Table 5.
[264] *Reference Manual* at 223-224.
[265] Haider Report ¶¶221-224.
[266] Equal to (1.09 – 0.99)/0.99.

TABLE 20: PERCENT INCREASE IN PRICE WHEN PRICE IS INCREASED BY 10 CENTS

| | | Dollar | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | **$1.xx** | **$2.xx** | **$3.xx** | **$4.xx** | **$5.xx** | **$6.xx** | **$7.xx** | **$8.xx** | **$9.xx** |
| **Cents** | **$x.09** | 10.1% | 5.0% | 3.3% | 2.5% | 2.0% | 1.7% | 1.4% | 1.3% | 1.1% |
| | **$x.19** | 9.2% | 4.8% | 3.2% | 2.4% | 2.0% | 1.6% | 1.4% | 1.2% | 1.1% |
| | **$x.29** | 8.4% | 4.6% | 3.1% | 2.4% | 1.9% | 1.6% | 1.4% | 1.2% | 1.1% |
| | **$x.39** | 7.8% | 4.4% | 3.0% | 2.3% | 1.9% | 1.6% | 1.4% | 1.2% | 1.1% |
| | **$x.49** | 7.2% | 4.2% | 2.9% | 2.3% | 1.9% | 1.6% | 1.4% | 1.2% | 1.1% |
| | **$x.59** | 6.7% | 4.0% | 2.9% | 2.2% | 1.8% | 1.5% | 1.3% | 1.2% | 1.1% |
| | **$x.69** | 6.3% | 3.9% | 2.8% | 2.2% | 1.8% | 1.5% | 1.3% | 1.2% | 1.0% |
| | **$x.79** | 5.9% | 3.7% | 2.7% | 2.1% | 1.8% | 1.5% | 1.3% | 1.2% | 1.0% |
| | **$x.89** | 5.6% | 3.6% | 2.6% | 2.1% | 1.7% | 1.5% | 1.3% | 1.1% | 1.0% |
| | **$x.99** | 5.3% | 3.5% | 2.6% | 2.0% | 1.7% | 1.5% | 1.3% | 1.1% | 1.0% |

*Note*: Each cell is calculated as the percent change in price resulting from a 10-cent increase to the "Dollar"—" Cents" price corresponding to its column—row.

163. Even in the case of Dr. Haider's cherrypicked examples of certain retailers with patterns of .49 and .99 pricing for certain products, a movement from $4.49 to $4.99 amounts to an increase of 11 percent—still under my predicted overcharge of 12 percent. Moreover, even for an item costing less, a move from $3.49 to $3.99 amounts to an increase of 14%, which would overshoot the predicted overcharge by so little that it provides an explanation for some pass-through in excess of 100 percent.

164. Moreover, record evidence shows that focal point pricing was not a commonly employed strategy for Pork products. For example, a Hormel internal pricing analysis for Hormel's "always tender" brand meats conducted by IRI reached the conclusion that [redacted][267] Presumably, [redacted]s.[268] He further testified that, [redacted].[269] At least for retailers of Hormel products, this is evidence against the use of focal point pricing.

165. Second, Dr. Haider opines that retailers may use a "high-low pricing strategy" under which retailers set a high base price, and then offer deep discounts to drive product traffic.[270] She also claims that retailers' use of promotional pricing affects my analysis of pass through. These are both are immaterial. My pass-through regression used

[267] Deposition of Eric Steinbach, Exhibit 1132 p. 30. [hereafter Steinbach Dep.].
[268] Steinbach Dep. at 60:19-61:12.
[269] Steinbach Dep. at 121:11-20.
[270] Haider Report ¶226.

*actual costs* and *actual prices* (after discounts) sold to consumers.[271] Since my analysis measures the actual amount of cost passed through to consumers, this point is moot. Further, a high-low pricing strategy to drive traffic has nothing to say about how price responds to changes in cost. To the extent that retailers offered consumers discounts, those discounts would still be present in a but-for world – just applied to a lower base price for Pork products. I am not aware of any record evidence that indicates Defendant Pork processors believed "high-low pricing strategies" would affect pass-through on their cost increases.

166. Finally, Dr. Haider claims that retailers' margins on products were inconsistent over time, meaning it was allegedly inappropriate to rely on an average pass-through estimate over time.[272] As I stated in my initial report, there are many reasons (including temporal lags) why pass-through may deviate temporarily from 100 percent.[273] But because the conduct began in 2009, and the Class Period began in 2014, there were *at minimum five years* for the overcharge to work its way through to the end retail product. Temporal deviations on pass-through between January and February 2014 are irrelevant

[271] For example, [redacted] explicitly stated that its dollar sales were net of discounts. *See* May 18, 2022 email from [redacted] to Dan Hedlund [redacted].

[272] Haider Report ¶¶231-223.

[273] Singer Report ¶177 n. 347, *citing* TF-P-001074604 (or HFC-PORKAT0000320282, SMITHFIELD01176261, JBS-PORK-00287921), [redacted] SMITHFIELD01263429, a [redacted] F-P-001752890, [redacted]

for a conspiracy that had been elevating Pork prices since 2009. Overcharges beginning in 2009 would certainly be felt by consumers during the Class Period.

## III. DR. JAMES MINTERT

167. Dr. Minter's report is an omnibus reply to Dr. Mangum, Dr. Williams, and myself.[274] Dr. Mintert's report does not provide specific criticism to any analysis I perform in my initial report. He offers no opinion on my analysis of market power, of my analysis of the qualitative evidence of collusion, on any of my regressions, on my analysis of common impact, or on my analysis of damages. His most precise criticism is that I have purportedly failed to account for various factors of supply and demand in my models. But Dr. Mintert never specifies which of my models he is talking about. As I have already shown in Part II.A.4, my regression models already account for the export demand variables Dr. Mintert alleges I omitted, and below I additionally show it additionally accounts for all of the factors Dr. Mintert alleges affect hog production. It am therefore not certain how his criticisms apply.

168. Dr. Mintert does not consider himself an econometrician, meaning any of his opinions regarding my regression analyses hold little weight.[275] Dr. Mintert did not look at Defendants' data used in this case, meaning he is uninformed about the data I used in my analyses.[276] Dr Mintert has not even reviewed the Agri Stats reports at the heart of this case,[277] nor is he aware of the basic setup of the Agri Stats program,[278] meaning he is completely untethered from Plaintiffs allegation of harm. In short, Dr. Mintert has very little to say about this case at all.

169. Below, I debunk a handful of Dr. Mintert's incorrect economic claims as they pertain to hog production, export, and capacity. Again, while Dr. Mintert's arguments in these areas not actual criticisms of my report, they are nonetheless wrong. I address them for completeness.

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[274] Mintert Report ¶6.

[275] Deposition of Dr. James Mintert (Nov. 9, 2022), [hereafter Mintert Dep.] at 150:21-25 [redacted]

[276] *Id.* at 151:12-14 [redacted]

[277] *Id.* at 166:17-18

[278] *Id.* at 169:15-24. [redacted]

## A. Dr. Mintert's Industry Claims That Are Demonstrably False

170. Dr. Mintert provides a broad overview of the pork and hog industries.[279] Many of the factual claims he makes are similar to those I provide in my own background of the pork industry.[280] However, Dr. Mintert makes a number incorrect claims in this sections that I address below.

### 1. Dr. Mintert's Incorrect Claim that Independent Farmers Determine Hog Supply

171. Dr. Mintert echoes Dr. Haider's incorrect claim that independent farmers, and not Defendants, truly "control" the hog market.[281] (However, at deposition he admitted that: "There is some degree of vertical integration in the industry.")[282] I have addressed this claim, and why it is wrong, in Part II.A.2.c above. All of the available evidence, including Dr. Mintert's own analyses, indicate that the supply of hogs is vertically controlled by processors. Even if it were not, as I explain in Part II.A.2. above, Defendants' "control" over the hog market would make no difference for my analysis of Defendants' *monopoly* power in the Pork market.

### 2. Dr. Mintert's Incorrect Claims on Processors and Hog Supplies

172. Dr. Mintert makes a series of un-economic claims regarding Pork processors' relationship with hog supplies throughout his report. These claims either contradict basic economic theory, the facts of the case, or Dr. Mintert's own logic.

173. *First,* Dr. Mintert claims that Pork processors "benefit" from higher hog supplies, because "all else equal, higher hog supplies translate to lower prices that processors pay for hogs."[283] What Dr. Mintert forgets is that Pork prices would *also* fall in this scenario. In a competitive market, economic theory demonstrates that the long-run price of a good is determined by the *minimum average cost* of producing that good.[284] So if the average cost for hogs falls for *all* Pork processors, the average price of Pork will fall alongside with it, leaving processors no better off. The only way Pork processors "benefit" is if they are able to increase their profit margins, which an across-the-industry increase in hog supplies would not achieve.

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[279] Mintert Report Part III.
[280] Singer Report Part I.
[281] Mintert Report ¶¶46-48.
[282] Mintert Dep. at 67:5-12.
[283] Mintert Report ¶80.
[284] MODERN IO at 90. If the market is monopolized, the price is set where marginal revenue is equal to marginal cost.

174. *Second,* Dr. Mintert makes the implication that "[p]acking is a services industry," and thus more hogs equals more packing demand and higher margins.[285] Pork processing is the categorical opposite of a services industry, which is commonly defined by the fact that a service does *not* produce a good or product.[286] Pork processors buy inputs (hogs) and produce outputs (Pork) like any other traditional manufacturer of products. And as such, if Defendants act as a monopoly producer of pork, Defendants benefit from processing the *optimal* number of hogs which leads to the *optimal* amount of Pork output. They do *not* benefit from producing above this optimal capacity, as I explain above in Part II.A.2.a.

175. *Third*, Dr. Mintert claims that "essentially all hogs end up sold and slaughtered" which he claims implies that "delaying hog slaughter does not necessarily lead to lower pork supplies as the hogs continue to grow in the interim and are ultimately slaughtered at heavier weights."[287] This should not be taken to mean that temporary delays in hog slaughter do not reduce long-term output. First, recall that long term hog supplies are determined by Pork processors' internal planning (for vertically integrated farms) and through desired contract quantities (for vertically restrained farms).[288] In the short term, the remaining *three percent* of hogs sold in the spot market—which can be understood as a "surplus" market for hogs—can have their spot prices manipulated by short run hog demand shocks such as temporary reduction in capacity, which put downward pressure on hog prices.[289] Farmers that are forced to sell "delayed" hogs at lower prices (or must keep them on their farms for added cost) see lower profit returns. Farmers that are economically punished for producing hogs above what the Pork processors mandate are unlikely to produce surplus hogs in the future. [redacted][290]

[285] Mintert Report ¶80.

[286] *Service Industry*, MERRIAM-WEBSTER (accessed November 2022), *available at* https://www.merriam-webster.com/dictionary/service%20industry. ("Service industry, noun: a type of business that provides services to customers rather than producing a product.").

[287] Mintert Report ¶¶20-21.

[288] *See* Part II.A.2a, *supra*.

[289] [redacted]. *See, e.g.,* JBS-PORK-02096990, at 993 [redacted] *See* KERNS00042249, at 250.

[290] Deposition of Jason Kurtz (Aug. 29, 2022) at 25:14-20.

### 3. Dr. Mintert's Claim There Is No Evidence Between Concentration and Harm to Consumers

176. Dr. Mintert makes the controversial claim that concentration in the market for Pork has not been shown to harm consumers.[291] To support this claim he cites to two studies, a 2009 U.S. Government Accountability Office meta review on agricultural concentration, and a 2013 study on meatpacking concentration,[292] which allegedly show no link between processor concentration and consumer harm. Although this argument has zero bearing on any analysis in my report, the suggestion that concentration is harmless to consumers is demonstrably false.

177. *First*, Dr. Mintert's literature is too old to be relevant. All of the concentration literature cited by Dr. Mintert's meta reviews are from studies that predate the Conduct Period. Dr. Mintert does not explain how, for example, a meat packer industry concentration study from 1988 is relevant three decades later.[293] The most *recent* concentration studies in these reviews are from 2007.[294] Meaning, even if Dr. Mintert is correct, and none of these papers found a connection between concentration and harm to consumers, it would say nothing about the Conduct Period. *Second*, there is the fact that Dr. Mintert's 2009 GAO report *did,* in fact, find evidence of meat packer's market power. In a footnote, Dr. Mintert admits as such that some studies in the GAO report found evidence of market power, but could not link it explicitly to concentration.[295] *Third,* Dr. Mintert's ignores more recent findings I cite in my initial report that the meat packing industry occupies "hyper-consolidated pinch point in the supply chain" that allows packers to "driv[e] down earnings for farmers while driving up prices for consumers."[296] *Fourth,*

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[291] Mintert Report ¶¶97-104.

[292] US Government Accountability Office, *Agricultural Concentration and Agricultural Commodity and Retail Food Prices,* BRIEFING FOR CONGRESSIONAL STAFF (April 24, 2009); Wohlgenant, Michael, *Competition in the US Meatpacking Industry*, ANNUAL REVIEW OF RESOURCE ECONOMICS (2013) 5(1), 1–12.

[293] Schroeter JR, *Estimating the degree of market power in the beef packing industry*. REV. ECON. STAT. 70:158–62.

[294] Dr. Mintert has referenced studies from 2009 and 2012, but neither of them measures market concentration. *See* my workpapers for details.

[295] Mintert Report ¶99 n. 234 ("While a few studies found some evidence of market power, it is unclear whether this market power was caused by concentration or some other factor.").

[296] Brian Deese, Sameera Fazili, and Bharat Ramamurti, *Addressing Concentration in the Meat-Processing Industry to Lower Food Prices for American Families*, THE WHITE HOUSE (Sept. 8, 2021), *available at* https://www.whitehouse.gov/briefing-room/blog/2021/09/08/addressing-concentration-in-the-meat-processing-industry-to-lower-food-prices-for-american-families/.

this claim ignores the fact that meat packers have been found guilty for price fixing and bid rigging, a direct consequence of industry concentration.[297]

## B. Dr. Mintert's Arguments About Factors Determining Hog Production, Export, and Capacity Trends Are Unavailing

178. In the next two sections of his report, Dr. Mintert makes various claims about the "fundamental factors" that affect hog production and Pork supplies. However, as mentioned above, Dr. Mintert does not consider himself an econometrician, did not review Defendants' sales data that inform my regression analyses, and did not review the Agri Stats reports or programs at the heart of this matter. Therefore, these claims should not be construed as arguments against my modeling of the Challenged Conduct in this case—since Dr. Mintert has no expertise in this area and has not reviewed the basic documents and data that inform my analysis. Nonetheless, I address Dr. Mintert's claims in these sections below.

### 1. Dr. Mintert's Claims Regarding Hog Production

179. Dr. Mintert opines on the "fundamental factors" that affect hog production decisions. He lists such factors as: Rising feed costs as a reason why farmers might have cut hogs supplies; H1N1 as a cause of lower pork demand; disease outbreaks which raise mortality and lower hog supplies; and gradual increases in farmer productivity over time.[298]

180. As I have already shown in Table 7, I explicitly control for each of these factors Dr. Mintert lists in my overcharge regression. I control for rising feed costs through my "Total Cost Per 270lb Pig" variable, which explicitly accounts for feed costs. I control for disease outbreaks which lower mortality through my "Piglet Loss Rate" variable. I control for H1N1 (AKA "Swine Flu") using my "Swine Flu Flag" variable. I control for increasing farmer productivity over time via my "Trend" variable, which as I explain in my initial report is included specifically to "control for any general changes that occur over time (such as technological or efficiency increases), which also may have an effect on pork prices."[299] If anything, Dr. Mintert's list of factors is a validation of the controls I included in my overcharge regression model.

### 2. Dr. Mintert's Claims About Exports

181. Section V of Dr. Mintert's report discusses in broad terms how export markets affect hog and Pork supplies.[300] He makes three claims in this section, that 1)

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[297] *Broiler Chicken Producer Indicted for Price Fixing and Bid Rigging*, DEPARTMENT OF JUSTICE (May 20, 2021), *available at* https://www.justice.gov/opa/pr/broiler-chicken-producer-indicted-price-fixing-and-bid-rigging.

[298] Mintert Report ¶¶105-140.

[299] Singer Report ¶115.

[300] Mintert Report ¶¶141-168.

exports are important, that 2) the U.S. Government promotes exports, and 3) that there are demand factors shaping export demand that I did not address. I address each of these in turn.

182. *First*, I agree with his proposition that exports are important. That is why I dedicate multiple subsections of my initial report explaining how exports can be used to decrease domestic supply and inflate prices.[301] Dr. Mintert makes no comment or rebuttal to these sections, nor does he address the record evidence that Defendants did, in fact, use Pork exports to support domestic prices.[302]

183. Instead, Dr. Mintert makes a series of claims that appear disconnected from Plaintiffs' theory of harm. He claims that more export demand leads to more domestic production,[303] and that some specific investments in export-focused facilities were profitable.[304] He cites an example of a *non-Defendant* processing plant with an aim to export 25 percent of its products.[305] I fail to see how this is relevant. Dr. Mintert offers a single throw-away line that "if the purpose of exports was to decrease domestic consumption, this goal could presumably be achieved with much lower level of investment."[306] This is a straw-man argument. I explicitly state in my initial report that "[a] firm's decision to export is not itself evidence of a conspiracy… [but] becomes suspicious when it is against the firm's unilateral self-interest[.]"[307] Nothing Dr. Mintert writes refutes this.

184. *Second*, Dr. Mintert writes that the U.S. government promotes pork export.[308] As an example of U.S. export policies, Dr. Mintert mentions that the U.S. government promotes pork exports by funding organizations like the U.S. Meat Export Federation (USMEF).[309]

185. Dr. Mintert does not explain how one should use this knowledge. Guessing at his intent, perhaps he is saying the promotion of exports increased radically during the Conduct Period. To see if this is the case, I analyzed the level of funding that the USMEF

[301] Singer Report Part I.E (discussing Defendants' export strategy in the alleged price fixing agreement), Part III.B.2.f (discussing how Defendants Used Agri Stats reports to make export decisions), and Part VIII.c.1.a.iii (discussing evidence of Defendants' export conduct).
[302] *Id.*
[303] Mintert Report ¶¶144-145.
[304] Mintert Report ¶¶149-151.
[305] Mintert Report ¶149.
[306] Mintert Report ¶150.
[307] Singer Report ¶43.
[308] Mintert Report ¶148.
[309] Mintert Report ¶146.

received from the United States Market Access Program between 2005 and 2020.[310] I found that the average USMEF funding between 2005 and 2008 was $14.4 million annually and the average funding from 2009 to 2020 was $14.5 million annually.[311] Meaning, there has been virtually no change in U.S. government pork promotion before and during the conduct period (and a net decrease in real spending if factoring in inflation.) U.S. government promotions are simply not relevant because they do not change across time.[312]

[310] *Market Access Program*, USDA (accessed Oct. 20, 2022), available at https://www.fas.usda.gov/programs/market-access-program-map. The Market Access Program is the largest source of government funding for the USMEF and provides over 250 percent more funding than the Agricultural Trade Program, Foreign Market Development Program, and Emerging Markets Programs combined. *2019 Financial Statement*, US MEAT EXPORT FEDERATION (accessed Oct. 25, 2022), *available at* https://www.usmef.org/downloads/USMEF-2019-Audited-Financial-Statements.pdf.

[311] *MAP Funding Allocations*, USDA (accessed Oct. 20, 2022), *available at* https://www.fas.usda.gov/programs/market-access-program-map/map-funding-allocations; *Funding*, U.S. MEAT EXPORT FEDERATION (accessed Oct. 20, 2022), *available at* https://www.usmef.org/about-usmef/funding/; *United States Meat Export Federation Inc,* PROPUBLICA (accessed Oct. 20, 2022), *available at* https://projects.propublica.org/nonprofits/organizations/521067268.

[312] *Similarly,* in the omnibus opposition at page 25, Defendants contend that the "2014 Farm Bill" awarded funding to help expand export markets. But they neglect to mention that the U.S. Meat Export Federation received similar allocations in prior years as well:

2014: $14,073,511 (https://www.fas.usda.gov/programs/market-access-program-map/map-funding-allocations-fy-2014-0).

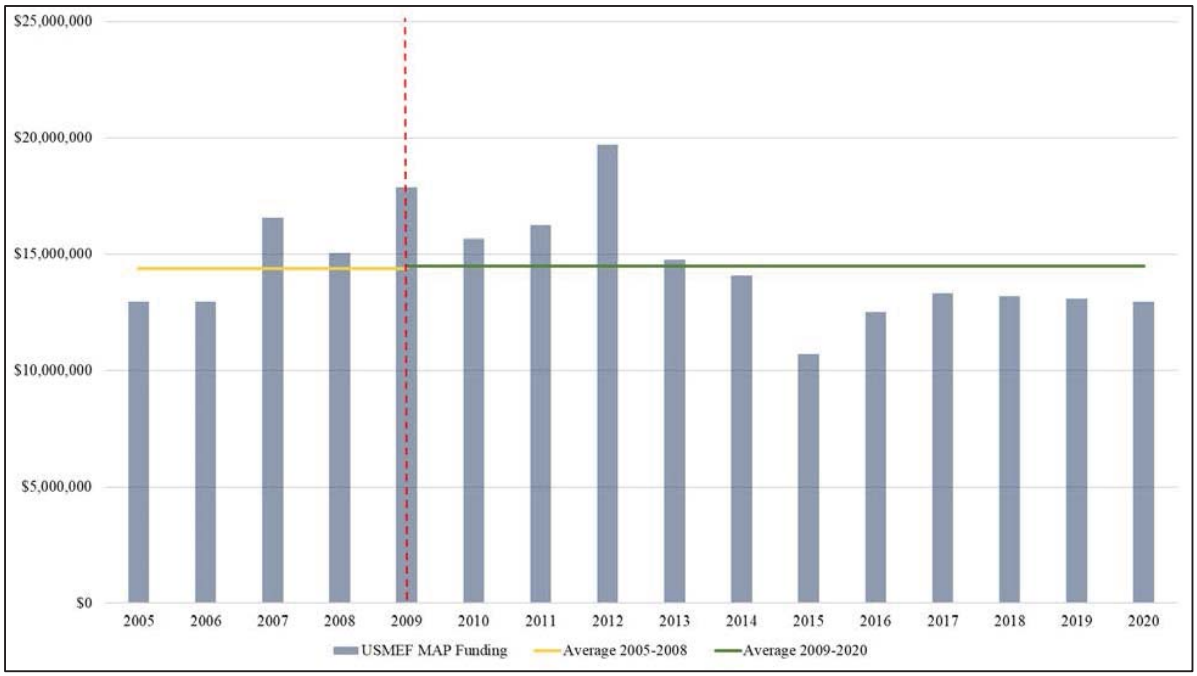
2013: $14,745,842 (https://www.fas.usda.gov/programs/market-access-program-map/map-funding-allocations-fy-2013).

2012: $19,703,780 (https://www.fas.usda.gov/programs/market-access-program-map/map-funding-allocations-fy-2012).

2011: $16,261,732 (https://www.fas.usda.gov/programs/market-access-program-map/map-funding-allocations-fy-2011).

2010: $15,679,189 (https://www.fas.usda.gov/programs/market-access-program-map/map-funding-allocations-fy-2010)).

FIGURE 6: U.S. GOVERNMENT PORK PROMOTION SPENDING OVER TIME
(USMEF MAP FUNDING)




186. *Third*, Dr. Mintert, also provides a list of alleged export factors which he claims "shape[d] demand for U.S. Pork exports during the alleged conspiracy period," and muses that I "failed to consider these important drivers of export demand" in my "analyses and opinions."[313] I address these factors in Part II.A.4. Dr. Mintert is attempting to find an "omitted variable" which, when included in the regression model, upturns the result. He has not, however, done the work to show that any of these potential variables do so. I test each of his proposed variables (as well as Dr. Haider's) above and show they have no effect on the conduct variable.

187. Further, exports—as compared to domestic pork availability or as a percentage of total product—accelerated during the conduct period. As I showed in Figure 6 of my initial report, exports as a *share of domestic production* increased sharply during the Class Period, from approximately 16 percent of production in 2009 to over 25 percent of production in 2020. Indeed, a Tyson internal presentation acknowledges that [redacted][314] Such growth over time is controlled for in my regression analysis by way of a linear time trend.[315] Mintert's Exhibit 22 does not

[313] Mintert Report ¶¶152-161.
[314] TF-P-002349999, native 66.
[315] Singer Report ¶115 ("I also add a linear time trend to control for any general changes that occur over time (such as technological or efficiency increases), which also may have an effect on pork prices.").

establish otherwise, because he examines absolute numbers rather than as a share of production.

188. In sum, none of Dr. Mintert's claims regarding exports have any relevance to my findings of Class-wide impact.

### 3. Dr. Mintert's Processing Capacity Analyses Support Plaintiff's Theory of Harm

189. In Part VI of his report, Dr. Mintert makes two claims about capacity utilization and capacity increases. Although Dr. Mintert intends to make the point that Defendants did *not* use capacity as a lever to artificially decrease the supply of Pork, his analyses demonstrate the opposite. Dr. Mintert's own analysis supports Plaintiff's theory of harm.

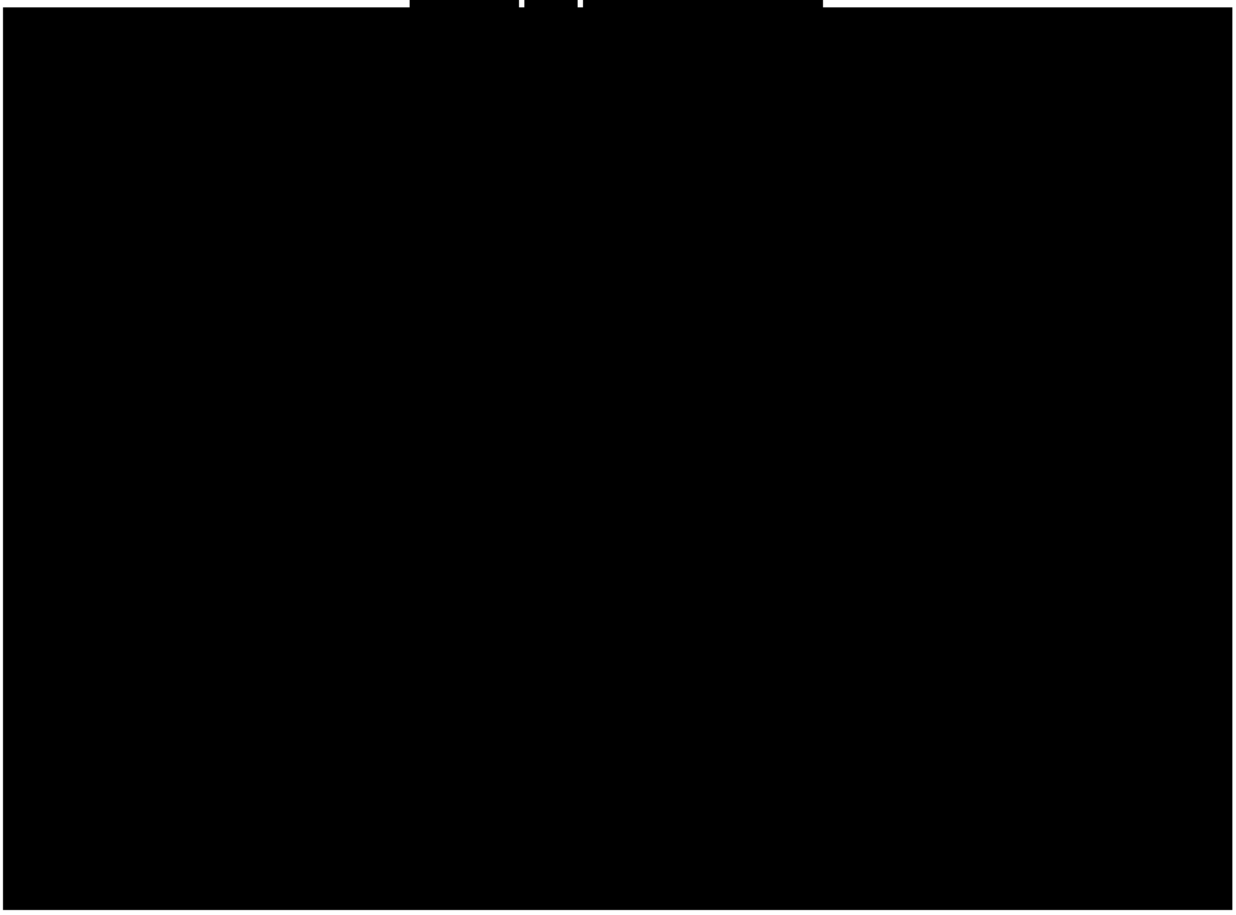
190. *First*, Dr. Mintert claims that capacity utilization was "high" over the Conduct Period.[316] But in making this point, he shows that capacity utilization was actually *lower* during the Conduct Period than before it. Dr. Mintert's Exhibit 24 shows capacity utilization was nearly two percentage points *lower* during the conduct period (measured 2009-2018) than the period before it (2005-2008).[317] Other record evidence confirms capacity utilization was *lower* during the Conduct Period than before it. For example, Figure 7 below is an internal Tyson document [redacted].[318] This is consistent with Plaintiff's claims that Defendants used capacity reductions to reduce domestic Pork supplies.

[316] Mintert Report ¶163.

[317] Mintert Workpapers. Dr. Mintert's estimated average capacity utilization is 94.9 percent between 2005 and 2008, and 93.3 percent between 2009 and 2015.

[318] TF-P-000128976, native 45.

FIGURE 7: TYSON INTERNAL ANALYSIS [redacted]



*Source*: TF-P-000128976, native 45

191. *Second,* Dr. Mintert analyzes industry processing capacity increases, finding that they rose during the Conduct Period.[319] But the relevant question is not whether capacity increased in absolute terms, the question is whether capacity increases *slowed down relative* to a but-for world absent the alleged cartel. Again, Dr. Mintert's own Exhibit 24 illustrates this point. In his exhibit, the actual capacity *declines* in the first few years of the Conduct Period before resuming growth, and the *rate of capacity growth* is demonstrably lower during the Conduct Period than before it. In Figure 8 below, I use Dr. Mintert's own data and simply plot the pre-2009 capacity trendline compared to the trendline of actual capacity growth from 2009-2018. The blue line shows what total capacity would have been if growth kept up at its 2005-2008 pace. The red line is the growth trend from 2009-2018. The trends unambiguously show that capacity growth was slower during the Conduct Period than the period before it. This is consistent with Plaintiff's allegations.

[319] Mintert Report ¶164, Exhibit 24.

FIGURE 8: DR. MINTERT'S EXHIBIT 24 ACTUAL SLAUGHTER TRENDS
(THOUSANDS OF HOGS SLAUGHTERED)

Regardless, the relevant metric is not capacity, but domestic availability—the amount of Pork available to domestic consumers. As I reported in Figure 6 of my initial report, domestic availability was substantially lower during the conduct period relative to the pre-conduct trend.[320] This supported by the record evidence. For example, a JBS investor presentation shows [redacted].[321] And a Tyson presentation likewise shows [redacted].[322]

[320] Singer Report ¶41, Figure 6.
[321] JBS-PORK-02182977, native 14.
[322] TF-P-000134683, native 19.

FIGURE 9: JBS ANALYSIS [redacted]

*Source*: JBS-PORK-02182977, native 14

*Source*: TF-P-000134683, native 19

192. All of this evidence is consistent with Plaintiffs allegations that Defendants' used a combination of tools (including capacity reductions and slowdowns) to decrease the domestic availability of Pork and increase Pork prices. Dr. Minter's evidence only helps support these claims.

## CONCLUSIONS

193. For the forgoing reasons, I maintain my conclusion that that economic injury and aggregate damages can be reliably demonstrated using methods and data common the Class.

* * *

Hal J. Singer, Ph.D.:

Executed on November 18, 2022.

## APPENDIX 1: MATERIALS RELIED UPON

**Bates Documents**

21CForum-0000008944
AGSTAT-P-0000019809
AGSTAT-P-0002613526
AGSTAT-P-0002620972
AGSTAT-P-0002793502
AGSTAT-P-0002802244
AGSTAT-P-0002802467
AGSTAT-P-0002819700
AGSTAT-P-0002861140
AGSTAT-P-0003014046
AGSTAT-P-0003392076
AGSTAT-P-0003406624
AGSTAT-P-0003410325
AGSTAT-P-0003415121
AGSTAT-P-0003415484
AGSTAT-P-0003426785
AGSTAT-P-0003472186
CLMNS-0000033170
CLMNS-0000036455
CLMNS-0000051029
CLMNS-0000081356
CLMNS-0000081357
CLMNS-0000119051
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CLMNS-0000655538
CLMNS-0000669589
CLMNS-0000670325
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HFC-PORKAT0000032620
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HFC-PORKAT0000064704
HFC-PORKAT0000068283
HFC-PORKAT0000095315
HFC-PORKAT0000153244
HFC-PORKAT0000192472
HFC-PORKAT0000196923
HFC-PORKAT0000197300
HFC-PORKAT0000200877
HFC-PORKAT0000202139
HFC-PORKAT0000209857
HFC-PORKAT0000258382

HFC-PORKAT0000261842
HFC-PORKAT0000262359
HFC-PORKAT0000320282
HFC-PORKAT0000356426
HFC-PORKAT0000372974
JBS-PORK-00020600
JBS-PORK-00143705
JBS-PORK-00259786
JBS-PORK-00287921
JBS-PORK-00570261
JBS-PORK-00645017
JBS-PORK-00729359
JBS-PORK-00734271
JBS-PORK-00754219
JBS-PORK-01141336
JBS-PORK-01194325
JBS-PORK-01215771
JBS-PORK-01335804
JBS-PORK-01389262
JBS-PORK-01983967
JBS-PORK-01993559
JBS-PORK-02096990
JBS-PORK-02182977
JBS-PORK-02444744
JBS-PORK-02476820
JBS-PORK-02477717
JBS-PORK-02479335
JBS-PORK-02481149
KERNS00042249
KERNS00116912
KERNS00181720
KERNS00188623
KERNS00193870
KERNS00195683
KERNS00195812
KERNS00200709
KERNS00215077
KERNS00250162
KRGPRKDD000000002-5
KRGPRKTD000000001-14
Rabo_0000348572
SBF0080489
SBF0143013
SBF0149705
SBF0175459
SBF0184924

SBF0276226
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SBF0314725
SBF0351271
SBF0371672
SBF0375666
SBF0428074
SBF0437621
SBF0459029
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SMITHFIELD00882452
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SMITHFIELD01062391
SMITHFIELD01064551
SMITHFIELD01071523
SMITHFIELD01091105
SMITHFIELD01167346
SMITHFIELD01176261
SMITHFIELD01263429
SMITHFIELD01285587
SMITHFIELD01286583
SMITHFIELD01357914
SMITHFIELD01946141
SMITHFIELD02021865
SMITHFIELD02229051
SMITHFIELD02229056
SMITHFIELD02239928
SMITHFIELD04739834
SMITHFIELD04803907
SMITHFIELD04831155
SMITHFIELD04912814
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TF-P-000051236
TF-P-000105985
TF-P-000128976
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TF-P-000231541
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TF-P-002121994
TF-P-002153432
TF-P-002246725
TF-P-002253399
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TF-P-002420429
TF-P-002574206
TF-P-002585941

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TF-P-1718780
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TRI0000052167
TRI0000089336
TRI0000313243
TRI0000313664
TRI0000313900
TRI0000433907
VG-P-0000005281
VG-P-0000005312

**Depositions**

Deposition of Bradley McKillip (July 22, 2022)

Deposition of Brian Snyder (Oct. 20, 2022)

Deposition of Brian Taphorn (Jan. 25, 2022)

Deposition of Curtis Stegall (May 25, 2022)

Deposition of Dale DeGroot (Sept. 23, 2023)

Deposition of Dan Schneider (July 27, 2022)

Deposition of Daniel Groff (Dec. 15, 2021)

Deposition of David Allen (July 21, 2022)

Deposition of Don Underwood (Sept. 26, 2022)

Deposition of Donald J. Temperley (Aug. 31, 2022)

Deposition of Douglas C. Clemens (Aug. 17, 2022)

Deposition of Dr. James Mintert (Nov. 9, 2022)

Deposition of Duke Sand (Oct. 12, 2022)

Deposition of Eric Steinbach (July 20, 2022)

Deposition of Hal Singer (June 24, 2022)

Deposition of Howard Thomas Hill (Aug. 29, 2022)

Deposition of Jason Kurtz (Aug. 29, 2022)

Deposition of Jeffrey Nuytten (July 7, 2022)

Deposition of Jerry Lehenbauer (Sept. 21, 2022)

Deposition of Josh Edwards (Oct. 14, 2022)

Deposition of Kenneth M. Grannas, Jr. (Dec. 17, 2021)

Deposition of Laila Haider (Nov. 3, 2022)

Deposition of Mark Furlano (Sept. 28, 2022)

Deposition of Martin Berlin (Sept. 7, 2022)

Deposition of Matthew McNeal (Sept. 13, 2022)

Deposition of Michael Hambright (Oct. 31, 2022)

Deposition of Michael McShane (July 26, 2022)

Deposition of Nick Schweitzer (Oct. 12, 2022)

Deposition of Paul Peil (Dec. 9, 2021)

Deposition of Rodney Brenneman (Aug. 4, 2022)

Deposition of Scott Saunders (Aug. 11, 2022)

Deposition of Seth Meyer, Ph. D. (June 15, 2022)

Deposition of Shayle D. Shagam (June 1, 2022)

Deposition of Steven Meyer, Ph.D. (Apr. 26, 2022)

Deposition of Tim Hiller (Oct. 14, 2022)

Deposition of Keith Barthelme (Oct. 4, 2022)

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## APPENDIX 2: DR. HAIDER AND DR. MINTERT'S EXPORT VARIABLES

### [1] Export Partner Currency Strength

Dr. Mintert claims that currency fluctuations in the U.S. dollar exchange rate could influence U.S. pork exports.[323] As evidence for the claim, Dr. Mintert cites Congressional testimony stating that the global financial crisis strengthened the US dollar and thus reduced export demand. Dr. Haider mentions movements in exchange rates as a factor affecting U.S. pork exports.[324]

To account for the strength of the U.S. dollar, I indexed the exchange rates of the 5 most commonly traded currency pairs for the U.S. dollar from 2004 to 2020 weighted by the total trading volume. The exchange rate data was sourced from the Federal Reserve Economic Database.[325]

### [2] Export Partner Gross National Income

Both Dr. Mintert and Dr. Haider make the claim that increased export demand for U.S. Pork was driven by an increase of the gross national income (GNI) in Pork importing countries.[326] In Mintert's exhibit 22, he shows that the per capita GNIs of the top 4 importers of US pork increased during the alleged conduct period.

To test whether the GNI of pork importers is a confounding variable during the conduct period, I constructed an index of the nominal GNIs of the top 4 pork importers from 2004 to 2020. The GNI data is sourced from the Federal Reserve Economic Database.[327]

### [3] U.S. Pork Production Cost Advantage

Dr. Mintert claims that the lower U.S. Pork production costs compared to the rest of the world contributes to higher U.S. Pork exports.[328] In Mintert's Exhibit 23, he shows that the United States had a lower average pork production cost than the European Union in 2016.

I created a variable to test this hypothesis by finding the difference between US and EU pork production costs per kilogram in constant 2018 Euros between 2008 and 2020. This data was linearly projected to estimate the years from 2004 to 2007 for which there was no

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[323] Mintert Report ¶155.
[324] Haider Report ¶100.
[325] FRED (accessed Oct. 10, 2022), *available at* https://fred.stlouisfed.org/graph/?g=UtP9.
[326] Mintert Report ¶, Haider Report ¶99.
[327] *Gross National Income For China*, FRED (accessed Oct. 10, 2022), *available at* https://fred.stlouisfed.org/graph/?g=Ut4n.
[328] Mintert Report ¶153.

data. The data on pork production costs was sourced from Dr. Mintert's Exhibit 23 source.[329]

**[4] South Korean Foot and Mouth Disease**

Dr. Mintert and Dr. Haider claim that my analysis does not address international swine disease incidents like the 2010-2011 South Korean Foot and Mouth swine pandemic which increased U.S. pork exports.[330] To address this, I constructed a dummy variable representing the South Korean Foot and Mouth pandemic from November 2010 to April 2011.

**[5-9] Trade Regulation Events**

Dr. Mintert claims that major trade events could decrease or increase the level of U.S. Pork export. They are: Pork bans during the Swine Flu pandemic, Russia banning U.S. pork imports, a trade war with Mexico, a trade war with China, and the US-Korea Free Trade Agreement.[331] Similarly, Dr. Haider points to changes in U.S. trade policy as a factor affecting U.S. Pork exports citing NAFTA (which occurs before the dataset and cannot be tested), Swine Flu related U.S. pork bans, and the US-Korea Free Trade Agreement.[332]

To test whether the inclusion of trade regulations in my analysis changes the significance of the conduct, I constructed dummy variables to represent the widespread bans of U.S. pork exports during the Swine Flu epidemic between April 2009 and October 2008[333], Russia banning US imports in February 2013 due to ractopamine[334], the trade war with

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[329] *2018 Pig Cost of Production In Selected Countries*, AGRICULTURE AND HORTICULTURE DEVELOPMENT BOARD (accessed Oct. 10, 2022), *available at* https://projectblue.blob.core.windows.net/media/Default/Pork/Documents/CostofPigProduction2018_200302_WEB.pdf; *2013 Pig Cost of Production In Selected Countries*, AGRICULTURE AND HORTICULTURE DEVELOPMENT BOARD (accessed Oct. 10, 2022), *available at* https://www.porcat.org/download/141215_bpex.pdf; *2020 Pig Cost of Production In Selected Countries*, AGRICULTURE AND HORTICULTURE DEVELOPMENT BOARD (accessed Oct. 10, 2022), *available at* https://projectblue.blob.core.windows.net/media/Default/Pork/CostOfPigProduction_2020_4568_161121_WEB.pdf.

[330] Mintert Report ¶157; Haider Report ¶100; *Control of Foot-and-Mouth Disease during 2010-2011 Epidemic, South Korea*, NATIONAL LIBRARY OF MEDICINE (April 2013), *available at* https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3647416/.

[331] Mintert Report ¶¶158-161.

[332] Haider Report ¶100.

[333] China Lifts Ban On U.S. Pork Products, NPR (accessed Oct. 10, 2022), available at https://www.npr.org/templates/story/story.php?storyId=114308710, https://www.reuters.com/article/us-flu-bans-sb/factbox-countries-slap-bans-on-pork-after-flu-outbreak-idUKTRE5406F520090501.

[334] Russia Imposes Retaliatory Import Ban On Agricultural Products, U.S. MEAT EXPORT FEDERATION (accessed Oct. 10, 2022), *available at* https://www.usmef.org/russia-imposes-

China between April 2018 and December 2019,[335] the trade war with Mexico between June 2018 and May 2019[336], and the 2012 trade agreement with South Korea and subsequent reduction of pork duties[337].

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[337] *U.S. – Korea Free Trade Agreement*, OFFICE OF THE UNITED STATES TRADE REPRESENTATIVE (accessed Oct. 10, 2022), *available at* https://ustr.gov/trade-agreements/free-trade-agreements/korus-fta.

## APPENDIX 3: PASS-THROUGH ANALYSIS OF RETAIL STORES INCLUDING [redacted]

| Entity | *Linear-Levels Model* | | *Linear-Log Model* | | | | Share of Defendant Retail Sales (2018) | Weighting (2018 Own-Data Sales) |
|---|---|---|---|---|---|---|---|---|
| | Pass-Through | R-Squared | Pass-Through | Price / Cost Ratio | Elasticity | R-Squared | | |
| [redacted] | | | | | | | | |

Notes: Any third party with Sales in Defendants' Data or Share of Category Sales equal to "—" is not accounted for within the Defendants' data.
This could be due to (1) an inability to match the entity name with the customer name within the Defendants' data, or (2) the third party purchasing product from another vendor indirectly, rather than through the Defendants.
For weighting, [redacted] uses 2020 data (2018 was not produced). Any third party with Sales in Defendants' Data equal to 0.0% has a negligible amount of direct purchases from Defendants.
[redacted] low R-Squared is in part due to the larger number of products in data. If product fixed effects are used (such as in Dr. Haider's pass-through analysis), the R-Squared is approximately 0.77.